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THE INELIGIBILITY OF THE EUROPEAN HOUSE
SPARROW IN AMERICA.

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IT is very regretable that the "sparrow question," which has already become a matter of national moment, should have degenerated into such a miserable personal controversy between the sentimentalists who misrepresent the facts and the ornithologists who understand them, that a prudent person, whatever his views, might refrain from having anything to do with it. But it is with me a matter of conscientious discharge of my duty to place the facts properly before the people, that they may be informed and warned in time, before the pest shall have become ineradicable. I do not write for ornithologists; for, so far as I am aware, there is not a scientific ornithologist in America, among those who have expressed any decided opinion, who are in favor of the wretched interlopers which we have so thoughtlessly introduced, and played with, and cuddled, like a parcel of hysterical, slate-pencil-eating school-girls. I have held a tight rein on this controversy from the first, and probably know more of its inside history than any other person; and I am in position to affirm that the sneers, the invectives, the ridicule and abuse, and the wild assertions of the leader or leaders of the pro-sparrow faction, result from a frantic despair in the face of the *facts* which ornithologists coolly adduce. The fact that the sparrow is a nuisance in a variety of ways, that it does not do any appreciable good, that it does a very obvious amount of damage, that it harasses, drives off and sometimes destroys useful native birds, and that it has no place in the natural economy of this country, are patent to every one who will take the trouble to see for himself. These same facts, some or all, are disagreeably obvious to

many persons, especially agriculturists whose fields and gardens are assailed. All of these same facts are admitted by competent ornithologists generally. None of them are publicly disputed, so far as I know, by any person or persons whose authority has any weight in a question of this kind.

The friends of the sparrow in this country fall in the following categories: First, those who know nothing and care nothing particularly about them, except that they "rather like" the pert and brusque familiarity of the birds—a class composed chiefly of children, women and old fogies. Secondly, those who are or were instrumental in getting the birds here, and are interested, either in reputation or in pocket, to keep them here. Thirdly, quasi-ornithologists who have been misled into hasty expressions of opinion to which they feel bound to stick. Fourthly, the *claquers* of the last, who play a sort of "*Simon-says-up*" game. Fifthly, a very few intelligent and scientific persons, but not practical nor professional ornithologists, who recognize fully what little good the sparrow undeniably does, and shape a favorable argument mainly from the undisputed advantages which result from a certain just and proper number of sparrows in *Europe*.

Most of my antagonists in this matter—those that fall in the first four categories above named—are of course not worth serious attention, for they either have no decided opinions of any sort, or else they are not open to instruction. But I have a particular word to say to those who draw an honest argument, not without some show of reason, from *the state of things in Europe*. I grant, if they wish, everything they adduce, from Prévost (who by the way is a great tally-ho! for the members of the third category above) to the last investigator of the contents of sparrows' crops; and I simply reply that the argument *does not apply to the case of the sparrow in America*. In Europe these birds are part and parcel of the natural fauna of the country. They are not, as I understand, petted, pampered and sedulously protected from their natural enemies as they are here. They shift for themselves, find certain sources of food supply, have a fair share of natural enemies, and are kept within due bounds of multiplication by natural causes; so that the "balance of power," to use a political phrase, adjusts itself. In short, they have their useful part to play, and they play it; they have their natural checks, and their increase is naturally checked. They are useful birds; and when,

after somewhat excessive multiplication, from any cause, they have been injudiciously exterminated in certain districts, it has been found necessary to re-stock such districts at great trouble and expense. All this, I believe, is admitted on all hands.

But the principle of *mutatis mutandis* does not apply to the sparrow in America. The things that would have to be changed to make the sparrows fit here cannot be changed. The complement of our avifauna was made up without these birds. There is no room for them; and if there is any work for them, time has shown that they slight it, or neglect it altogether. The only way to make the sparrows eat the worms they were imported to destroy, and which they seem to specially dislike, would be to starve them into such unpalatable fare. Instead of that, we sedulously feed them from our tables till they are grown too fat and lazy to think of worms. And if we did not do so, it would be useless to expect them to take to a diet they do not relish, when the streets are full of manure, of which they are specially fond, and the trees of our orchards and lawns are full of fruit-blossoms, and the gardens are full of small fruits, and the fields are waving with grain—all these things being the *natural* food of birds of the sparrow tribe, to whom an insectivorous diet is only an occasional and temporary variation.

Again, the matter of the limitless multiplication of these pestilent famine-breeders presents itself very differently in this country. They are extraordinarily prolific. A single female has been known to lay over thirty eggs in a season. They ordinarily raise three or four broods a year, and may have half a dozen at a time. They are safely housed from their natural enemies; rather, they have no special enemies in this country, and such enemies as their excessive abundance might raise up against them have, in at least one case, been summarily disposed of, as in the silly action of the Bostonians regarding the shrikes. There is thus practically *no* check upon their limitless multiplication, and they are insidiously multiplying at a rate that perhaps few suspect. A short ten years ago a sparrow was something of a sight anywhere; now, the millions we have are countless. The sparrows have played mischief enough already, I know; but I say deliberately, that this is nothing to what the next decade or two will witness if this desperate sparrow-mania goes on. We may have before long people knocking at the Congressional gates for an

appropriation for a Sparrow Commission, like the Grasshopper Commission now sitting, to consider if there be any available relief from the scourge. When the sparrows overflow into all the country—and they are beginning to do so already—and settle in hordes on the grain fields, a good many will doubtless be destroyed by the birds and beasts of prey; but it may then be too late. At present, an occasional stone from some idle boy, or an occasional cat on the woodshed, are all the sparrow has to look out for.

I think it will be evident that the *argumentum ad Europam* cannot logically apply here. I have dwelt upon it because it is the only show of reason I find in my worthier opponents; yet it is fallacious, thoroughly fallacious. The crude asseverations of the less worthy, the misrepresentations and tergiversations of interested persons, and all the vociferations of the pyrgitomaniacs are wasted in a case like this, or are not wasted only in so far as they serve to dress up a melodramatic spectacle, at seeing which well-informed persons usually smile. The philopassirites may be reminded that sentiment is not science, the present being a question of applied or economic science; that satire, ridicule and sophistry, however potent in the political or theological arena, are impotent in the field of science.

For the common good, as well as for the benefit of those who may care to defend the sparrows, I make the following specifications of my general charge against these birds.

1. They neglect entirely, or perform very insufficiently, the business they were imported to do. In spite of some good service at one season of the year, in a few particular localities, against some particular kinds of insects, the state of our shade trees remains substantially as it was before their introduction. Some of the decrease of noxious insects at times is due to their periodical decrease, with which the sparrows have nothing to do; and in spite of assertions to the contrary, people are still scraping trees, and employing the usual defenses against insects, in precisely those places where it was said that the sparrows had done the business.

2. They attack, harass, fight against, dispossess, drive away and sometimes actually kill various of our native birds which are much more insectivorous by nature than themselves, and which might do us better service if they were equally encouraged. This

fact is suppressed, explained away, or flatly denied, according to the disingenuousness, the aptitude for quibbling, or the audacity of the third and fourth categories of persons above described. It is attested, however, by numberless competent and veracious eye-witnesses.

3. They commit great depredations in the kitchen-garden, the orchard and the grain-field. We are only as yet on the very threshold of this matter, yet how obvious it is! And what may be expected, when, instead of a few hundred million sparrows, we have the millions of millions which will be ours in a few years, if we persist in this folly.

4. They are personally obnoxious and unpleasant to many persons. For myself, I "rather like" them too; they rather amuse and interest me, and are not at all disagreeable, as long as I can keep their disastrous results out of mind. I am not a delicate woman, nor yet a squeamish man, to be shocked by their perpetual antics during the spring and summer; being something of an anatomist I can stand it without embarrassment; but all are not thus constituted. Neither am I a nervous invalid, to be fretted and annoyed into positive illness by the incessant turmoil at the window; but others are. Nor do I, I regret to say, own a house where the steps and window-sills and trellis-work and lawn are so befilthed that none of my servants will stay if they have to clean up after the birds; others, however, are in such case. I grant that this is all a matter of taste, rather than of science; but such as it is, it is largely against the sparrows.

5. They have, at present, practically no natural enemies, nor any check whatever upon limitless increase. This would be undesirable, even in the case of the most desirable birds. As the case stands *we are repeating the history of the white weed and the Norway rat*.¹

I have to make one suggestion and to offer two recommendations.

It is a fact, that with all this talk and counter-talk about the food of the sparrow, and to what extent it may feed upon insects injurious to our fruit and shade trees, nobody has yet made the experiments obviously necessary to determine exactly what the

¹A writer in the *London Garden* says: "It may be remembered that in one of the back numbers of the "*Garden*," I mentioned that the introduction of the sparrow would turn out to be a great mistake, and they are now finding this out."

birds eat in this country. I would, therefore, suggest the obvious propriety of finding out exactly, in the only proper and scientific way, instead of sawing the air any longer in such futile way. I suggest, that, at the height of the insect season, at the time when the sparrows should be eating the bugs if they ever do, in some places fairly infested with the bugs, a sufficient number of sparrows be killed and examined in respect to the contents of their crops. Let the authorities of any of our large cities, preferably Boston, where the birds *are said* to have done so much good, and where the sparrow combination talks loudest, furnish to proper persons, say five hundred sparrows, whose stomachs shall be examined by some competent botanist and entomologist together. If noxious insects should be found to form the greater portion, or even any considerable portion of the food of these birds, I would yield the case as far as this particular count is concerned. At present I continue to believe that the scraping and other occupation of the city-forestering Othellos is not gone.

As to my recommendations: I am often asked, "Would you then have sparrows exterminated?" While I am not prepared to advise such an extreme measure as this, I do not hesitate to declare that prompt and stringent measures should be taken, as *a matter of national economy*, to check the increase of the birds. We have enough already. Without unnecessary cruelty, the numbers might be kept down, if not diminished, by the following gradually and continuously operating means:—

I. *Let the birds shift for themselves*; turn them loose and put them on the same footing as other birds. That is, take down the boxes and all the special contrivances for sheltering and petting the birds; stop feeding them; stop supplying them with building materials; let them take care of themselves.

II. *Abolish the legal penalties for killing them.* The birds are now under the arm of the law, which protects them from most of the natural vicissitudes of bird-life. Let the boys kill them if they wish; or let them be trapped and used as pigeons or glass balls are now used, in shooting matches among sportsmen. Vast numbers of pigeons are destroyed in this way; there are even "sparrow-clubs" in various cities, which make a business of practicing on various of our small birds, for which the European sparrows would be an admirable substitute, answering all the conditions these marksmen could desire. In this way the birds

might even be made a source of some little revenue, instead of a burden and a pest; they are to be had in practically unlimited numbers, and could be sold by the city to such persons as might desire to use them for sporting purposes.

The present article is to be regarded as a mere outline of the important subject. I have collected a voluminous mass of testimony during the past two or three years, which I intend to digest, in order to place the whole matter in its true light on permanent record, in treating of the species in the "Birds of the Colorado Valley." For the plague has spread even to that remote portion of our much be-sparrowed country.

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WALKS ROUND SAN FRANCISCO—THE BAY SHORE.

BY W. N. LOCKINGTON.

SOUTH of the city, on the shore of the bay, lies Mission creek, once no doubt as attractive a spot as any to be found in the neighborhood, but now converted into an exceedingly mal-odorous mud-flat, the recipient of the refuse of factories and of the drainage of the city. Right across the mouth of this creek, or rather bay, the Southern Pacific railroad has constructed a broad mole of earthwork, leaving no entrance save a narrow channel crossed by a drawbridge, over which runs the road leading to the part of the bay shore we have chosen for our excursion. Crossing the Potrero peninsula by a deep cut through the hill, we emerge upon the trestle-work spanning Islay creek, and after running the gauntlet of the powerful scents of Butcher-town, are at last deposited on the slope of the hill behind South San Francisco.

In front of us the San Bruno mountains stretch in a dark green line from bay to ocean; on our right runs a range of low hills, over whose tops the city is slowly advancing, throwing out the sentinels of scattered houses, and to our left spreads out its glorious Bay of San Francisco, glowing under the summer sun. The bay is broad here, and the coast range of Alameda county looks very distant and misty. Far away to the south, beyond the San Bruno hills, beyond the long stretch of lowland, backed by tree-clothed heights that lie behind them, till the shores grow indistinct with the distance, we can see the outline of this inland sea (for such it is), the shores drawing closer and closer as

they recede. In the far distance a thin line of smoke marks the position of a steamer *en route* to or from San José.

The shore of the bay in our vicinity is much indented by rocky peninsulas alternating with valleys, the outlets of which are filled either with a marsh or a lagoon, produced by the little streams that find their way from among the round-topped hills. Hunter's point, which is in our rear soon after we leave the cars, runs out into the bay two or three miles, then follows a marshy tract on which are placed the butts of a rifle company, then an isolated mound rising close to the edge of the bay, then a valley with a lagoon, and south of this, a lofty hill with serrated outline terminating baywards in a precipitous promontory, with a needle-rock as an outlier. This lagoon, the serrated hill and the beach around it are our hunting-ground to-day. We are armed with a spade and intend to dig for clams. Luckily it is low tide, a large area of silt is uncovered in front of the lagoon, and we hasten onwards to try our chances. Not that there is much risk of missing the clams when they spout beneath the feet at every step, and when every spadeful throws up at least two or three. The most abundant clam at this spot is the ubiquitous *Mya arenaria*, which also has possession of the entire beach near Oakland, on the Alameda county side of the bay; but the native Californian *Schizotherus nuttallii*, a monster of a clam when full grown, reaching a length of about seven inches, is also found here deep in the mud. Its ugly black siphon is as thick as a finger, and its gaping shell is clothed with a black epidermis. Along with the *Mya* a few individuals of the cockle, *Cardium corbis*, and of the Tellinoid clam, *Macoma nasuta*, are occasionally turned out by our unceremonious spade. Here is a large round burrow, with the sides as smooth as if plastered. This we know to be the dwelling-place of one of those fossorial cray-fish of which some four or five species occur along the Pacific coast, and we dig on, hoping to find a *Callianassa*, a genus that we are assured is found in the bay, but which we have never been so fortunate as to procure there, though we have found it in abundance at Tomales, some fifty miles to the northward. Out he comes at last, a fellow about six inches long, with a hairy rostrum and two pincers of equal size, swimming away for dear life. It is only *Gebia pugettensis* Dana, the commonest of common species. Whether living in the mud, in the sand, among stones, it is all the same to *G. pugettensis*. The dredging machines

in the entrance of Oakland harbor brought it up in abundance, and the deep-water specimens appeared to be larger than those found above low tide level. Attached to the swimmerets of *Gebia*, in the spring months, will usually be found a parasitic isopodous crustacean, *Phyllodurus abdominalis* St., an odd-looking creature, the two sexes of which differ a good deal in form. I have never found more than two upon a single *Gebia*, and these two are usually male and female, sometimes there is a female alone, but as the male is smaller and blessed with greater locomotive powers, he may in those cases have been overlooked or have escaped. The female is literally nearly as broad as she is long, with seven little pairs of legs ending in hooked claws tucked under her lopsided body. The male is long and slender, symmetrical, with the segments of the body well separated, and is very much smaller than his unwieldy spouse.

Very often a small bivalve mollusc, *Pythina rugifera* Carpenter, is attached to one of the swimmerets of the larger *Gebias*. A large *Nereis*, about twelve inches long, gay with iridescent tints when placed in clear sea-water, completes the list of the silt-inhabiting creatures at this spot. All the cockles found are very small, yet shells of the species three inches across lie upon the beach, and at times the Chinese colony located near the lagoon is in possession of many a sackful of large individuals. An "old inhabitant" who has been clam-digging, volunteers an explanation of this. The bed of these cockles, he says, is below low water, and they are only washed ashore after a storm. "It puzzled him somewhat" at first, to find out where they came from.

A little farther on, as we leave the lagoon, the banks gradually rise into precipices, the beach is strewn with loose rocks, with here and there a larger boulder rising high among its fellows. We overturn a number of the smaller rocks, thinking it possible that we may find beneath them the large red *Cancer productus*, which is common enough in the bay, and which we have found in abundance at this season, in similar situations in Tomales bay. But either we are a little too early in the season to catch them so high out of the water, or they do not, in this locality, venture beyond low-water mark. Certain it is that we have not found them alive, with the exception of a straggler or two on the beach near San Francisco. But if, in July, we return to this spot, we shall find beneath many of these stones, each in a little puddle of

sea-water, many individuals of a singular fish belonging to the family Batrachidae or toad-fishes. If we attempt to catch it, it will salute us, if we are not careful, by thrusting into our hands the sharp spines with which its gill-covers are armed, at the same time emitting a most characteristic grunt, which though not very loud is rather alarming to one unacquainted with the fish, and usually causes him, in conjunction with the wound from the spines, to drop it *instanter*. A glance at the under side of the rock which once roofed in her abode, will show us, covered as it is with ova about the size of a pea, that she comes to the shore to spawn. This fish, *Porichthys notatus* as it was named by Girard, is sufficiently ugly when looked at above, but its under side sparkles with rows of shining pores, emitting the mucus which covers its body and renders it as slippery as an eel.

Under every loose rock we turn over there is a colony of a pale greenish little crab, with a square carapax and whitish pincers which are uplifted menacingly at the unwelcome intruders as their owners scuttle off to hide themselves under the nearest shelter. This species, *Heterograpsus oregonensis* Dana, is commonest at this point, but it is often accompanied by the almost equally common and much prettier *Heterograpsus nudus* Dana, which attains larger dimensions, and has a carapax and legs beautifully marbled with red and purple brown. The first species is extremely abundant in the brackish creeks which permeate the marshes round the bay.

In the crevices of the larger rocks, up to quite high-water mark, another square crab, dark-green in color, and with the last joints of its four pairs of walking feet armed with spinules, by which it holds tightly to the slippery surface, may be found in considerable numbers, but it is rather difficult to secure entire, not only from the difficulty of reaching it in its hiding places, but from the extreme readiness with which it throws off some of its limbs when escape proves impossible. This is *Pachygrapsus crassipes* Randall. Farther on still, where the loose rocks are larger, the large *Cancer magister* Dana, the species usually eaten by the practical carcinologists of San Francisco, is occasionally found, having presumably retired from the deeper water to shed his plate-armor in peace. But it is too early in the season for him, and we encounter nothing new until, between two rocks, we see an eight-armed object crawling along, the arms united by a membrane, so

that it looks like a walking umbrella, the handle supplied by the elongated oval body which rises from the center of the disk. At the base of the body, next the arms, are a pair of goggle eyes, which seem to wear anything but an amiable expression as we cautiously seize him by the body and introduce him forcibly into a jar of sea-water, taking care that he does not clasp his sucker-covered arms around our hands as we perform the operation.

Small and comparatively innocent is this *Octopus punctatus* Gabb, for he does not measure more than two feet from tip to tip of arms, but even he, could he get our finger between the parrot-like jaws which lie deep down inside the umbrella, would make us think we had caught a tartar. This, and the six others we see before our excursion is ended, are all baby Octopi, but in the market of San Francisco occasionally hangs a "devil-fish" of the same species with arms from five to six feet long, an uncanny object when dead, and one to be avoided when alive. Not long ago in the Straits of Fuca, near Victoria, an Indian woman was drowned by an Octopus probably of this species. John Keast Lord tells us that the Indians of Vancouver's island fish for them with a spear and a knife, each at the end of a pole some fifteen feet long. Driving the spear into the body they hold the Octopus at a safe distance while, wielding the knife with the other hand, they sever one by one the formidable arms, whose double rows of suckers would, could they but once lay hold, never leave their victim till he was brought within reach of the jaws. An old Frenchman who comes along with one of these octopi impaled on a stick tells us he is taking it for a treat to his wife and family. Finding a second, he grows ecstatic as he pounds its head (as he calls the body) on a rock, apostrophizing it meanwhile in terms of mingled dislike and contentment. They surely must be good. Frenchmen eat them, Spaniards think "gibones" a delicacy, Italians do not disdain them, Chinamen devour them; why not Anglo-Saxons? But the Anglo-Saxon, and the Celt also, have much to learn yet in the way of food, and must surely learn much as the world becomes more crowded, unless they wish to be "improved" away from the face of the earth.

We have now rounded the point, and reached the valley beyond. There is the usual sandbar, backed by a small lagoon, from which a rillet flows across the beach. Here we leave the shore and ascend the hill, gathering the wild flowers as we go. Patches of

Lupinus micranthus and *Orthocarpus ciananthus* fleck the hillside with blue and white, but the show of the flowers is not on this southern side, exposed to the rough westerly blasts of the Pacific as they sweep through the valley, but on the moister and comparatively sheltered north-eastern slope. One of the most abundant of flowers, here and in the whole vicinity of San Francisco, is the *Œnothera primuloides*, a stemless plant with yellow blossoms, each on its own peduncle, reminding us of the primrose. Another flower, plentiful on this hill, but very local in its distribution, is the purple and white *Collinsia bicolor*, belonging to the same order with the Mimuli, two kinds of which, *Mimulus luteus* and *M. glutinosus*, may be found near by, the former by the water-courses and in the wet places which abound after the heavy rains, the latter on the dry hillsides. The great yellow daisy-like *Layia platyglossa*, with its ray-florets tipped with cream-color, from which it has earned the name of "tidy-tips," is to be seen here and there, but does not show as it does across the bay, at Oakland, where whole fields are golden with its blossoms.

The *Eschscholzia californica* is here, of course; there is not a month in the year when it cannot be found, but now it is in its glory, its gorgeous orange petals inducing every urchin that comes along to gather the "lilies," as he calls them.

Another of the poppy-tribe the little "cream-cup," *Platystemon californicum* Bentham, may be found if looked for, for it is modest, unlike poppies in general. *Orthocarpus* is a very conspicuous genus in California generally, on this hill-side we gather, besides the white one already mentioned, the purple and yellow *O. castillejoi*, and the tiny-flowered *O. pusillus*.

Nemophila insignis is almost out of blossom, yet we find a few, and among the loose stones high up the hill we find one of its rarer relations, the rough, almost prickly, *Phacelia toasifolia* Torrey. The more common Phacelias, *P. circinata*, with its coarse foliage and cat's tail-like curled flower-spikes, and, the more delicate *P. tanacetifolia*, we do not meet with in this ramble.

The rose order is represented only by one plant, the humble *Acena trifida*, a near relation of the *Sanguisorba* or Burnet.

Almost the only shrubs to be found are a dwarf oak and the poison oak, *Rhus diversiloba* Torrey-Gray, the latter unfortunately only too common, as we find to our cost next day, when our wrists inflame and become covered with the pustules produced

by its juice. It lurks in every bunch of tall herbage, its glossy, green leaves and greenish racemes of flowers mingled with the vetches, phacelias, and other innocent plants in so intricate a way that it is almost impossible to collect them without contact with it. On the hillsides it is low and straggling, its roots running to great distances under the surface, and throwing up stems and leaves in unexpected places; in the copses it forms large bushes, alone or mingled with other shrubs; but in the forests it is a huge climber, mounting the tall pines and firs and strangling them. When a climber, its leaves are much larger and lighter in color, and it is usually believed to be a different plant from its humbler brethren of the meadows, being distinguished as Poison ivy.

There is but little of animal life on the down, for there is no shelter for birds, or thicket-loving mammals. The ground-squirrel, *Spermophilus beecheyi*, is present here as it is in every green field and every hill-side round the bay.

Man has killed off its natural enemies, the smaller carnivorous mammals and the birds of prey, and has planted the once wild country with seeds that suit its appetite, so that it flourishes and increases in spite of poison, traps, and guns, till it is a terrible nuisance to every farmer. The only other wild quadruped we find is not a mammal, but a lizard. We come upon two individuals among a heap of stones, and after quite a chase, capture one, a fine fellow, in a livery of reddish and yellowish-brown mixed with darker tints. It has quite a long tail as it is, yet it has evidently been mended at the tip. It is *Gerrhonotus grandis*.

We are now at the foot of the hill, close to the Chinese colony, from whose huts arises a most unsavory smell of rotting fish. Here we have John Chinaman at his lowest, dwelling in squalid huts with ground for the floor, yet even here his virtues of persistent industry, economy, and quickness to lay hold of everything which can be turned to account, are clearly evident. All the day these fishers work, their unwieldy flat-bottom boats are scattered in all directions, and their nets are spread for big and little fish alike, spite of laws against the destruction of fry. The little fish disdainfully thrown on the shore and left to rot by the Italian fisherman, are by the Chinese gathered carefully up and dried. While the white laborers assemble by thousands to hear incendiary speeches, with occasional adjournments to the nearest saloon, John calmly works on. If the capitalist employs

him, he does his duty; if left without employment from others, he finds out work for himself; he runs a laundry; he fishes; he peddles vegetables; he hunts up rags and bones; he turns gardener, choosing all the little valleys between the sand hills, irrigating them, and raising large crops where the white man raised nothing; all the time serenely confident that as long as his prices are lowest, he will find plenty of customers, some of the best of them among the very men who shout so loudly "the Chinese must go." Truly, unless the government promptly pass some law to restrain the Chinamen from free access to these shores, the poor white man even if sober and industrious, will soon find life growing very hard, for what chance has he, with his ideas of comparative luxury in house, food and clothing, probably a wife and family, and often some intellectual tastes also, against a rival who lives in an unfloored hut, feeds on rice, stuffs his blouse with hay when the weather is cold, has only himself to keep, and never troubles his head about literature, science, or politics, yet all the time keeps a keen eye on the main chance, earning and keeping every cent he can, and scarcely ever resting from labor except for the needful sleep.

Note.—In my last paper I referred the Planorboid shell found in Mountain lake, S. F., to the genus *Helisoma*, but I find it to be a genuine *Planorbis*. The tiny little flat shell from the same pond is *Menetus opercularis*. Prof. Verrill has informed me that the small starfish mentioned as probably new is the *Asterias equalis* of Stimpson. It is rare and local in this neighborhood.

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SOME CHARACTERISTICS OF THE CENTRAL ZOÖ- GEOGRAPHICAL PROVINCE OF THE UNITED STATES.¹

BY A. S. PACKARD, JR.

IN recent studies on the extent of the native breeding places of the Rocky Mountain locust, my attention, while in the field and afterwards in working up some of the results then obtained, has been directed to some of the faunal characteristics of the Central province; my own observations bearing especially on the distribution of certain insects and especially the Phyllopod Crustacea, whose distribution west of the Mississippi presents some points of considerable interest.

¹ Read at the last April meeting of the National Academy of Sciences, Washington.

The first attempt to divide the United States as a whole into zoölogical provinces was in 1859, by Dr. LeConte, in his "Coleoptera of Kansas and Eastern New Mexico (Smithsonian Contributions, 1859)." He divided the Coleopterous fauna of the United States into three great zoölogical districts, distinguished each by numerous peculiar genera and species, which, with but few exceptions, do not extend into the contiguous districts. He named them the Eastern, Central and Western divisions; so that to him is due the credit of first distinguishing the Central province.

In 1866, Prof. Baird,¹ from a study of the avifauna of the United States, concluded that "the ornithological provinces of North America consist of two great divisions of nearly equal size in the United States, meeting in the vicinity of the 100th meridian, the western half divisible again into two, more closely related to each other than to the eastern, though each has special characters. These three sections form three great provinces to be known as the western, middle and eastern; or those of the Pacific slope; of the great basin, the Rocky mountains and the adjacent plains; and of the fertile plains and region generally, east of the Missouri."

In 1871, Mr. J. A. Allen,² divided the avifauna of the United States into two provinces, the eastern and western, the latter embracing the Pacific coast. (Since this paper was read Mr. Allen's late essay has appeared, in which he adopts Prof. Baird's division into three provinces. The geographical distribution of the mammalia, etc. Bulletin of Hayden's U. S. Geographical and Geological Survey of the Territories, May 3, 1878).

In 1873,³ Mr. W. G. Binney published a map of the distribution of our land shells, dividing the molluscan fauna into the Eastern, Central and Pacific provinces.

In 1875, Prof. E. D. Cope in his check list of North American Batrachia and Reptilia⁴ divided the Nearctic realm of Slater into the Austroriparian, Eastern, Central, Pacific, Sonoran and Lower Californian regions. He remarks that "the Pacific region is nearly related to the Central, and, as it consists of only the narrow district west of the Sierra Nevada, might be regarded as a sub-di-

¹ American Journal of Science and Arts, January and March, 1866.

² Bulletin of the Museum of Comp. Zoology, April, 1871.

³ Catalogue of the Terrestrial Molluscs of North America.

⁴ Bulletin U. S. Nat. Mus., Washington, 1875. Bull. Mus. Comp. Zool., 1873.

sion of it. It, however, lacks the mammalian genera *Bos* and *Antilocapra*, and possesses certain peculiar genera of birds, as *Geococcyx*, *Chamea* and *Oreortyx*. . . . There are some genera of reptiles, e. g. *Charina*, related to the Boas, *Lodia*, *Aniella*, *Gerrhonotus* and *Xantusia*, which do not occur in the central sub-region. There are three characteristic genera of Batrachia, all Salamanders, viz: *Anaides*, *Batrachoseps* and *Dicamptodon*; while the eastern genera *Plethodon* and *Diemyctylus* reappear after skipping the entire central district." Cope adds that "the fresh-water fish fauna is much like that of the central district in being poor in types." Cope's Sonoran region is evidently a northward extension of the Mexican fauna, which sends its outliers into southern Arizona, Utah and New Mexico, and is not to be taken into account in discussing the faunal provinces of the United States alone.

In 1876, Wallace in his "Geographical Distribution of Animals," divided the Nearctic region into four sub-regions, viz: the Californian, Central or Rocky mountain, Alleghanian and Canadian. His Central sub-region extended to Lat. 25° N.

It will be seen from this review that by general consent the fauna of the Pacific slope is on the whole regarded as belonging to a separate province from that of the Rocky Mountain plateau, whether we regard the mammals, birds, reptiles, amphibia, Coleoptera or land shells.

Botanically, as observed by those who have traveled across the plains to California, the flora of the great plains is quite different from that of the Eastern States, and the Pacific flora is as distinct from the central flora. This has been clearly shown by Sir J. D. Hooker and Prof. Asa Gray in their preliminary notices of the results of their botanical researches in connection with Dr. Hayden's U. S. Geological Survey of the Territories.

In traveling last summer, in pursuance of the work of the U. S. Entomological Commission, I passed rapidly over a large area of the Central province lying north of the fortieth parallel, including Colorado, Wyoming, Northern Utah, Western Idaho, Central and Northern Montana, and was thus enabled to observe in a superficial way the general features of the flora and fauna nearly up to the British line. I was impressed with the resemblance of Central and Northern Montana to Northern Utah, the insect-fauna being apparently nearly identical. Doubtless this insect-fauna extends

northwards into the Upper Saskatchewan valley as far as the southern limit of trees, there being much less intermixture with Canadian forms than might be expected. Then crossing the Sierra Nevada, and going overland to Oregon, I was able to trace the gradual passage of the Californian insect-fauna into the Oregonian, with some Canadian forms; and by passing up the Columbia river to Wallula, here as well as at Reno in Nevada, to perceive the great differences between the fauna of the Pacific slope and that of the plains and deserts of the Central province.

In briefly reviewing the different orders of insects, other than Coleoptera, which have been so fully elaborated by Dr. LeConte, and certain groups of Crustacea, we will begin with the Hymenoptera, and point out a few characteristics distinguishing the Central from the Pacific provinces. In 1865 and 1866 a large number of Coloradian fossorial Hymenoptera passed under the writer's hands, Mr. Cresson having previously described from this material a large number of Coloradian Hymenoptera of all families. The richness of the hymenopterous fauna of Colorado struck me, and I was impressed with its distinctness from that of the Eastern States. I have seen few of these forms from California. Among the family of ants (*Formicidae*), there is one form characteristic of the plains which does not occur on the Pacific slope. This is the *Pogonomyrmex occidentalis* (Cress). I have seen its large hills at Brookville, Kansas, and observed them in Colorado and Utah and in Reno, at the base of the Sierra Nevada, but not west of that point. It ranges, according to Mayer, south into New Mexico, and San Luis valley, Colorado. Its nest forming large elevations in cleared spaces sometimes six or eight feet in diameter, is one of the characteristic sights on the plains.

Among the Lepidoptera, family Bombycidæ, there are several forms peculiar to the central district, notably the genus *Dirphia* (Coloracia), *Eulencophæus*, *Gloveria* (*Mesistesoma*), *Hemileuca Juno* and *Hera*, and *Platysamia gloverii*. The family is feebly represented in the Central province, but richly so by numerous species on the Pacific slope, which do not appear east of the Sierra Nevada.

The Phalænidæ, or geometric moths, are richly developed in the Pacific province, and but poorly in the Central province, owing to the absence of deciduous trees; of those found in the latter some occur west of the Sierra Nevada, and some are peculiar to the plains and Rocky mountains.

Of the *Orthopera* there is a large number of species peculiar to the plains which I did not observe in the Pacific States; of these, *Caloptenus spretus* is thoroughly characteristic of the Central province. It does not occur in the Pacific and only breeds temporarily in the Eastern province, and its natural limits define well those of the province itself. It ranges up to lat. 53° N. on the North Saskatchewan and south to Southern Utah and Colorado. The exact limits of its distribution are given in the First Annual Report of the U. S. Entomological Commission.

While we are still ignorant of the distribution of insect life between the hundredth meridian and the Pacific ocean, there seems good reason, from what we do know, and from the great differences in the flora, and the soil and climate, especially the rainfall east and west of the Sierra Nevada, to regard this lofty range as the general point of separation defining two grand zoölogical provinces. Many groups of insects abounding west of the mountains do not occur east, except in isolated cases. Of a number of Myriopods found on the Pacific coast none occur east, and so of the Arachnida so far as known, and Dr. Thorell, who has worked up some of the spiders of Colorado, was struck by the general similarity of some forms to those occurring in the plateau of North-eastern Asia. Among the insects there are a few Pacific forms which closely resemble European species, and which are not represented east of the Sierra Nevada. It should be borne in mind, however, that the Sierra Nevada does not present an absolute barrier, as a considerable number of species occur on each side of it, and it is well known that the Rocky Mountains are but a slight barrier to the distribution of the animals on either side, the fauna of Colorado, Northern Utah, Wyoming, Montana and Idaho being quite homogeneous, and the fauna of these Territories the same on each side of the high mountain ranges traversing them.

Among the fresh-water Crustacea the *Astaci* of the Pacific slope, as is well known, belong to the European genus *Astacus*, those east of the Sierra Nevada to the genus *Cambarus*, which is so richly developed in the Eastern provinces, especially in the Mississippi valley.

The distribution of the fresh-water *Phyllopoda* is of peculiar interest. The family *Apodidae* is restricted to the Central province: none are found in the Mississippi valley, and none in Cali-

fornia. Of the four species of *Apus* all inhabit the Central province; *Apus aequalis* lives on the plains of the Rocky mountains, and also at Matamoras, in Mexico. It is a curious fact that *Apus lucasanus* Pack., not only occurs at Cape St. Lucas, Lower California, but is also an abundant species at Ellis, Kansas. This is a parallel case to the presence of certain birds at Cape St. Lucas which, as observed by Prof. Baird, belong to the Central rather than to the Pacific province. Of the genus *Lepidurus* there are two forms (*L. couesii* and *L. bilobatus*) characterizing the plains. *L. couesii* occurs in Northern Montana, and is allied to a recently described *Lepidurus* from Archangel, Russia, according to Lilljeborg.

The eastern limits of the Central province extend to near the 97th meridian in Kansas and Nebraska, according to the writer's observations.

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THE REPORT OF THE COMMITTEE OF THE AMERICAN ASSOCIATION OF 1876 ON BIOLOGICAL NOMENCLATURE.

BY E. D. COPE.

IN the year 1842 the British Association for the Advancement of Science took into consideration the question of zoölogical nomenclature, and through a committee made a report, which embodies a series of recommendations in the form of rules. In 1863 another committee of the British Association revised these rules and reprinted them with various additional recommendations. This report was republished in this country with a few additional suggestive notes by Prof. A. E. Verrill, in 1869.¹ Since that date the question has been discussed by the American entomologists Scudder, Edwards and LeConte.

The rules issued at the earlier periods above mentioned dealt largely with etymological and literary questions, while admitting in general terms the necessity of observing the law of priority of date. The energy of some of the resurrectionists of obsolete works in bringing to light old names, however, soon drew attention to the importance of ascertaining the real nature of priority of date; and the close coincidence of date of some modern publications, has brought up the question from another side. The

¹ Amer. Jour. Sci. and Arts, July.

entomologists first began to handle the subject critically, the most practical article with which I am acquainted being that of W. H. Edwards.¹

In order to establish a basis of definite action in this matter, the American Association for the Advancement of Science at its meeting in Buffalo, in 1876, appointed a committee "to obtain an expression of opinion from the working naturalists of America in regard to the nature of a set of rules for facilitating the decision of questions relating to nomenclature," etc. The committee consisted of Capt. Wm. H. Dall, of the U. S. Coast Survey, and the results of his work are now given. To my own mind the method pursued by Capt. Dall was excellent, and the results are very satisfactory as displaying a degree of unanimity among American naturalists so complete as to constitute their opinions, as embodied in Capt. Dall's report, a set of rules which no one can safely disregard on the one hand, or hesitate to follow on the other.

Capt. Dall's prefatory remarks are as follows:

In accordance with the understanding and resolutions of the Section, by which this duty devolved upon him, your Reporter prepared a circular which was printed under the supervision of the permanent secretary and circulated by the Smithsonian Institution, a copy of which is appended to this report.

The circular was sent to all who, within the last five years, might be included under the designation of publishing naturalists, and of whom the address could be obtained. This list included about eighty-five names, from a number of which (for various reasons) a response was hardly anticipated. They were used, however, in order that the fullest opportunity might be afforded to all those who might desire to express an opinion.

The responses received to date (August 14, 1877), are forty-five in number. While a few honored names, to whose views all would attribute due weight, are not on the list, yet it includes most of those whose contributions are familiar in the Proceedings of American Scientific societies, and an unquestionable majority of the best working naturalists of the country. The views of several of those from whom no response was received, have been incorporated in the appendix by means of citations from their works.

The queries contained in the circular relate chiefly to certain points, concerning which a diversity of opinion has existed among naturalists; the general principles of nomenclature not being in question. The responses are divided into affirmative, negative

¹ Canadian Entomologist, February, 1873.

and doubtful, while in individual cases some queries received no response. The answers classified as doubtful, comprise those which by their tenor indicated that the purport of the particular query had not been clearly understood, and some in which the person replying avowed his inability to express a preference for any one of several modes of proceeding.

The gratifying unanimity which is exhibited in the responses to certain of the more important and clearly defined questions at issue, indicates that a thorough study of the more complicated questions by the light of the general principles of nomenclature, would result in a practical agreement on the part of American naturalists in relation to nearly all the matters in debate.

It is evident from the responses of naturalists, that their opinion is generally adverse to any attempt to limit, by arbitrary rules, the right of publication in the most convenient direction, and against any statute of limitations in regard to scientific names. This seems to be in accord with the principles of justice, equity and general usage in nomenclature, though at times inconvenient in its results. It may be confidently expected that the majority of authors, when their attention has been drawn to it will, for their own interest as well as that of science, avoid in future publications, the methods (or want of method) which in the remote past sowed so many germs of present difficulty.

The circular with replies is preceded by the following note by Capt. Dall :

NOTE.

The question with which the working naturalist is most frequently brought face to face—and in the decision of which so much trouble is experienced and such diverse opinions are elicited—are chiefly those which involve the right of any one of several names to be considered as properly proposed and entitled to take precedence of others, provided its priority in time of application be established.

The rule that names (otherwise unexceptionable) which are prior in date, are to be accepted in nomenclature to the exclusion of all others, is conceded by all naturalists.

The rules recommended by the Committee on Nomenclature of the British Association for the Advancement of Science, have been generally adopted; though in certain details they are regarded by many naturalists as defective. Nevertheless they have largely contributed to that uniformity which is so desirable in the matter of nomenclature.

It has been thought that a similar recommendation on the part of the American Association might reach many who are not conversant with the British rules and tend to produce in the works of the rising generation of American naturalists a similarly beneficial agreement.

The differences of opinion which have arisen, are chiefly in matters of detail and intrinsically of very slight importance.

One of the most serious in its effect upon nomenclature is that in regard to what names shall be considered as really binomial; another as to what is necessary to definitely establish a name in order that if prior to any other it may be accepted as properly proposed; and most of all as to the date to be adopted as that of the beginning of binomial nomenclature. This latter question, as to facts, on the authority of De Candolle, stands as follows:

A series of rules for nomenclature was to some extent foreshadowed by Linnaeus in his *Fundamenta Entomologiae* of 1736. These rules were first definitely proposed in the *Philosophia botanica*, which appeared in 1751. These rules, however, related almost exclusively to the generic name or *nomen genericum*. In 1745, he had employed for the first time a specific name (*nomen triviale*) composed of one word, in contradistinction to the polynomial designation of a species (*nomen specificum*) which was previously the rule among naturalists. That which now seems the most happy and important of the Linnean ideas, the restriction of the specific name as now understood, seems to have been for a long time only an accessory matter to him, as the *nomina trivialia* are barely mentioned in his rules up to 1765.

In 1753, in the *Incrementa botanicae*, while expatiating on the reforms which he had introduced into the science, he does not even mention the binomial nomenclature. In the *Systema Nature*, Ed. X, 1758, for the first time the binomial system is consistently applied to all classes of animals and plants (though it had been partially adopted by him as early as 1745), and hence many naturalists have regarded the tenth edition as forming the most natural starting point. The system being of slow and intermittent growth, even with its originator, an arbitrary starting point is necessary. In the twelfth edition (1766-68), numerous changes and reforms were instituted, and a number of his earlier specific names were arbitrarily changed. In fact, Linnaeus never seems to have regarded specific names as subject to his rules.

The last was recommended by the British Committee as the starting point. They have since, however, receded to the extent of admitting to recognition some ichthyological works printed between the dates of the tenth and twelfth editions.

The circular with the appended replies is as follows:

QUESTIONS TO WHICH AN ANSWER IS DESIRED.

- I. What date shall be taken as the commencement of the binomial era in nomenclature? For Ed. X, 18. Ed. XII, 17. 1736, 1. Botanists, 1753, 2. No answer, 7.
- II. Shall phrases composed of two words which may appear in the publications of naturalists whose works

preceded, or who did not in such works adopt the binomial system of nomenclature, be considered as binomial names? No, 32. Yes, 5. No answer or doubtful, 8.

- III. If so, shall the first word of the said phrase be entitled to recognition as a generic name? No, 32. Yes, 5. No answer or doubtful, 8.
- IV. If an author has not indicated his adoption of the binomial system by discarding all polynomial names in a given work, are any of his names therein entitled to recognition otherwise than in bibliography? No, 18. Yes, 18. Doubtful, 4. No answer, 5.

Example. Da Costa in his work on the Conchology of Great Britain, varies from binomial to polynomial in his designations of species, and some of his "generic" names contain two or three words, while others apparently conform to the Linnean system. Should any of these names be retained?

- V. Does the reading of a paper before a scientific body constitute a publication of the descriptions or names of animals or plants contained therein? No, 39. Doubtful, 2. Yes, 4.
- VI. Is a name in the vernacular of the publishing author, or a vernacular rendering from a classical root unaccompanied by a Latin or Greek form of the name, entitled to recognition except in bibliography? No, 36. Doubtful, 2. Yes, 4. No answer, 3.
- VII. Is a name applied to a group of species without a specification of any character possessed by them in common (that is, without any so-called generic diagnosis or description), entitled to recognition as an established generic name by subsequent authors? No, 38. Doubtful, 3. Yes, 3. No answer, 1.
- VIII. Is a generic name applied to a single (then or previously), described species without a generic diagnosis or description of any kind, entitled to recognition as above, by subsequent authors? No, 37. Doubtful, 3. Yes, 4. No answer, 1.
- IX. Is a name, when used in a generic sense, and otherwise properly constituted, subject to have its orthography changed by a subsequent author, on the ground that a proper construction from its classical roots would result in a different spelling? No, 21. Doubtful, 3. Yes, 19. No answer, 2.
- X. If the previous question be answered in the affirmative, it may be further enquired whether an author has a right to assume that a given name is derived from classical roots, when the author of the name did not

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so state, and on this assumption to proceed to change the said name to make it agree with the assumed proper construction in any case? and especially when by the asserted reformation the generic name becomes identical with one previously proposed for some other animal or plant, and hence will fall into synonymy? No, 25. Doubtful, 2. Yes, 6. No answer, 12.

Example. Schumacher described a genus which he called *Paxydon*, living no derivation. A sub-sequent author described a genus *Pachydon*, giving the derivation. A third writer assumed that Schumacher's name had the same derivation as *Pachydon*, and that both, if correctly written, would be *Pachyodon*. The last mentioned then proposed a new name for *Pachydon*, which he had thus made to appear preoccupied. Was this allowable? No, 26. Doubtful, 3. Yes, 8. No answer, 8.

- XI. Should a generic name, otherwise properly constituted, but derived from the specific name of its typical species, or similar to that of one of the species included under it, be rejected on that account? No, 40. Doubtful, 4. Yes, 1.

Note. It is proper to state that this is an important question, since Linnæus himself, and others, formed many generic names in this manner, and a large number of such names are currently accepted, especially in botany and among vertebrate animals.

- XII. Shall a subsequent author be permitted in revising a composite genus (of which no type was specified when it was described) to name as its type a species not included by the original author of the genus in that latter author's list of species given when the genus was originally described? No, 37. Doubtful, 2. Yes, 5. No answer, 1.

Example. Linnæus described a genus *Chiton* with a very few species. After many species had been described by others, a later author divided the genus into a number of genera, and reserved the name of *Chiton* (restricted) for a species described many years after the death of Linnæus and belonging to a section of the *Chitonidae* unknown to Linnæus; while to the Linnæan chitons he gave new appellations.

- XIII. When an old genus without a specified type has been subdivided by a subsequent author, and one of the old species retained and specified to be the type of the restricted genus bearing the old name,—is it competent for a third author to discard this and select another of the original species as a type, when by so doing changes are necessitated in nomenclature? No, 39. Doubtful, 4. No answer, 2.

- XIV. Shall an author be held to have any greater control over or greater privileges with relation to names of his own proposing, after the same have been duly published, than any other subsequent author? No, 40. Doubtful, 2. Yes, 2. No answer, 1.

- XV. For instance, when an author describes a genus and indicates a species as its type, is it allowable for him subsequently to substitute any other species as a foundation for his genus, or to use the original type as a foundation for another new genus? No, 38. Doubtful, 1. Yes, 2. No answer, 4.
- XVI. If an author describes a genus and does not refer to it any then or previously described existing species, can the genus be taken as established? No, 33. Doubtful, 7. Yes, 1. No answer, 4.
- XVII. If an author applies a specific name to an object without referring it to some then or previously described genus, is the specific name entitled to recognition by subsequent authors? No, 33. Doubtful, 4. Yes, 7. No answer 1.
- XVIII. When a generic name has lapsed from sufficient cause into synonymy, should it be thenceforth entirely rejected from nomenclature? or should it still be applicable to any new and valid genus? Reject, 19. Accept, 23. Doubtful, 1. No answer, 2.
- XIX. Should a name which has been once used in one sub-kingdom, and has lapsed into synonymy, be considered available for use in any other if not entirely rejected from nomenclature? No, 20. Doubtful, 1. Yes, 18. No answer, 6.
- XX. Should a name be liable to be changed or a later one substituted for it, if the original be supposed to be inapplicable or contradictory of the characters of the species or genus to which it was applied? No, 28. Doubtful, 3. Yes, 13. No answer, 1.
- Example.* A fish without teeth was named *Polyodon*, which name had come into use; when a later author substituted *Spatularia* on the ground that *Polyodon* was inapplicable.
- XXI. Is it advisable to fix a limit of time, beyond which a name which had been received without objection during that time shall be held to have become valid, and no longer liable to change from the resuscitation of obsolete or uncurrent but actually prior names? No, 28. Doubtful, 1. Yes, 13. No answer 3.
- XXII. If so, what shall this period be? No answer, 35. The others range from 10 to 100 years.
- XXIII. Should it be permitted to alter, or replace by other and different appellations, class, ordinal and family names, which owing to the advance of science and consequent fluctuation of their supposed limits have become uncharacteristic? Yes, 30. Or should these

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also be rigidly subject to such rules of priority as might be determined on for generic or specific names? No answer, 4. Yes, 11.

- XXIV. Should or should not absolute certainty of identification be required before it be permissible to reject a modern and generally adopted name in favor of a prior but uncurrent designation? Yes, 38. Doubtful, 2. No answer, 5.

Note.—Many of the old descriptions of species sufficient for identification when few species were known, are entirely insufficient at the present day to distinguish between allied species. Should, therefore, a modern specific name with a recognizable description be made to yield to an older name unless the identification can be made beyond any cavil?

- XXV. Is it desirable to adopt any classification of periodical literature by which certain exclusive channels for publication of descriptive papers in natural history shall be designated for use by authors who desire to secure the rights of priority for new names proposed by them? No, 26. Desirable but impracticable, 9. Yes, 8. No answer, 2.

Note.—An affirmative answer will imply that names which may be proposed through other than the designated channels, after the latter shall have been decided upon, shall not be entitled to recognition in questions of priority.

- XXVI. Is it desirable to adopt any analogous rule in relation to the character or extent of distribution of any independent publication or pamphlet to which it must conform, on pain of losing its right to recognition? No, 21. Desirable but impracticable, 10. Yes, 14.

Note.—If the answer to either or both of the two preceding questions be affirmative, a note specifying the nature of the proposed classification or restrictions may be appended to this list.

- XXVII. Should a series of rules be recommended for adoption by the Association, would you be guided by these recommendations in cases where they might not agree with your own preferences? Yes, 29. Yes, with reservations, 15. No, 1.

LIST OF NATURALISTS FROM WHOM REPLIES TO THE CIRCULAR
HAVE BEEN RECEIVED.

- J. A. Allen, Museum of Comparative Zoölogy.
 W. G. Binney, Burlington, N. J.
 Richard Bliss, Jr., Cambridge, Mass.
 Dr. Thomas M. Brewer, Boston Society of Natural History.
 Dr. P. P. Carpenter, McGill University.
 S. F. Clark, Johns Hopkins University.
 T. A. Conrad, Philadelphia Academy of Natural Sciences.

- Dr. J. G. Cooper, California.
Prof. E. D. Cope, Philadelphia.
W. H. Dall, Smithsonian Institution.
Prof. J. D. Dana, Yale College.
Dr. J. W. Dawson, McGill University.
W. H. Edwards, West Virginia.
S. W. Garman, Museum of Comparative Zoölogy.
Dr. T. N. Gill, Smithsonian Institution.
Dr. Asa Gray, Harvard University.
A. R. Grote, Buffalo Academy of Sciences.
Dr. Herman Hagen, Museum Comparative Zoölogy.
Dr. Geo. H. Horn, Philadelphia.
Prof. Alpheus Hyatt, Boston Society of Natural History.
Ernest Ingersoll, New York.
W. P. James, Cincinnati, Ohio.
Prof. D. S. Jordan, Indiana.
Dr. J. L. LeConte, Philadelphia Academy of Natural Sciences.
Dr. Joseph Leidy, Philadelphia Academy of Natural Sciences.
Dr. James Lewis, Mohawk, N. Y.
Theodore Lyman, Museum of Comparative Zoölogy.
T. L. Mead, New York.
S. A. Miller, Cincinnati, Ohio.
Dr. A. S. Packard, Jr., Peabody Academy of Sciences.
F. W. Putnam, Museum of Comparative Zoölogy.
Prof. C. V. Riley, U. S. Entomological Commission.
Prof. C. Rominger, State Geologist, Michigan.
Dr. J. T. Rothrock, University of Pennsylvania.
S. H. Scudder, Cambridge, Mass.
Prof. N. S. Shaler, State Geologist of Kentucky.
Herman Strecker, Reading, Pa.
Prof. Cyrus Thomas, U. S. Entomological Commission.
Geo. W. Tryon, Jr., Philadelphia Academy of Natural Sciences.
P. R. Uhler, Peabody Institute, Baltimore.
Sereno Watson, Harvard University.
Dr. C. A. White, U. S. Survey of the Territories.
J. F. Whiteaves, Palæontologist to the Canadian Geol. Survey.
Prof. R. P. Whitfield, Amer. Museum of Natural Hist., N. Y.
Dr. H. C. Yarrow, United States Army.
Two accidentally unsigned.

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THE ANCIENT PUEBLOS, OR THE RUINS OF THE
VALLEY OF THE RIO SAN JUAN.¹

BY EDWIN A. BARBER.

PART I.

AS early as the sixteenth century, about the year fifteen hundred and thirty-nine (1539), some of the deserted cities of a pre-historic people (which have since been found to be so numerous all through a portion of the Pacific slope of North America, were observed by several of the Spanish expeditions which had penetrated into the country north of Mexico, known then under the general name of New Mexico, including the present Territory of Arizona. Many of the towns of this section were at that early date found to be in ruins, presenting every indication of a great antiquity; while others, which now lie mouldering in the cañons of the far west, were found by these old explorers, at that time, to be occupied. The course of the Spaniards, headed by Coronado and others, lay to the south of the San Juan river, passing through the valley of the Rio Grande del Norte, on the Atlantic slope, the seat of the so-called Pueblo Indians, and westward through Zuñi, then known as *Cibola*, and so on to the ancient province of *Tusayan*, or our modern *Moqui*, on the Pacific or western slope of the Rocky mountains.

Until the past year or so, however, the great stretch of country lying west of the Range, including portions of Southern Colorado and Utah, and much of Arizona and New Mexico, was entirely or almost unknown. Our only knowledge of it consisted in the inconclusive and contradictory reports of expeditions or individuals which had crossed the borders of the ancient domains; and from their casual discoveries we were made aware of the existence of a multitude of ruins which extended as far north as the thirty-eighth degree of latitude. Unsatisfactory as this information was, it served to arouse a latent interest and to create a thirst for more facts among cultured circles, and opened a new and vast field for scientific research. During the summer of 1874 a pioneer corps was sent out by Prof. F. V. Hayden, of the United States Geological Survey, to photograph any ancient structures which might be discovered in South-western Colorado and South-eastern Utah, thus preparing the way, as it were, for a

¹Extracts from a paper written by the author and read before the *Congrès des Américanistes*, at Luxembourg, in September, 1877, with additions.

more thorough exploration of this country during the next season. The results of this expedition were so flattering, and the report of the photographist, Mr Wm. H. Jackson, so full of interest, enthusiasm and valuable information, that several parties were ordered to the field in the summer of 1875.

In passing through this portion of the west, the traveler is first impressed with the great extent of the territory over which the ancient remains occur. Generally speaking, they occupy the great valleys drained by the San Juan river and its tributaries, the Rio Grande del Norte, and the Colorado of the west, covering an area of probably 200,000 square miles.

The communities, it is evident, sprung up along the banks and valleys of the once well-watered streams, and as many of these are now entirely dry, this fact would suggest the idea that the entire character of the country has undergone a great physical change. A calculation as to the time required to effect such an alteration might assist us in arriving at the approximate age of these remains. On further investigation, it will be discovered that not only the larger water-supplies have failed since these structures were occupied, but the lesser ones also, in the form of springs, reservoirs and lakes; because in the majority of instances to-day, not a drop of moisture exists within a radius of twenty-five or thirty miles from many of the more important ruined villages. The entire country must at one time, and during the prosperity of the race, have been well-watered and fertile. The beds of the parched flood-washes must formerly at times have conveyed the waters of overflowing torrents, as everything yet indicates, and the valleys were productive of corn and the indigenous vegetables, for the very farms and corn-fields are still traceable in the river-bottoms, laid out in rectangles, and well defined by the dense growth of a hardy species of *Helianthus*. A great blight must have swept over the land, scorching and parching every green thing, and lapping up every particle of moisture, transforming the luxuriant valleys into deserts of rocks and sand.

The ruined buildings of this portion of the west may be arranged under two general heads: First, *Valley Remains*; Second, *Cliff Houses*.

The former class consists of those which were built on level ground, either in the river-bottoms or at the feet of ravines and cañons; and these may be subdivided into two classes: First,

Pueblos or towns, and secondly, *Defensive structures*. Valley ruins were by far the most extensive, sometimes covering miles of bottom land, in an almost unbroken series of huge buildings, but they were not nearly so numerous as the cliff houses. The ancient tribe or tribes congregated together along the water-courses for sociability (man being a gregarious animal) and for mutual protection.

The cliff-houses are of three sorts: First, *dwellings*; secondly, *watch-towers*; and, thirdly, *caches* or *store-houses*. These were built among the sandstone bluffs and crags of the cañons; at every altitude and in every conceivable position. From the base of an almost vertical wall, up to the very summit of the mesa, a distance, sometimes of over a thousand feet, these human eyries are perceptible, perched sometimes on almost or quite inaccessible shelves, or on the very pinnacle of some isolated boulder, whose sides look down perpendicularly for hundreds of feet. In every imaginable condition of location, they existed and the beholder is impressed with a feeling of awe, in simply gazing on the works of the intrepid architects; on the places where human beings once dwelt; places which now are wholly out of reach of the explorer. The walls of the buildings are sometimes built along the ledges of rock, on the horizontal foot-holds which occur among the cliffs; but far more frequently, the natural caves and hollows (formed by the erosion of the atmosphere) were converted into dwelling places.

One of the most noticeable features of all of these cliff-structures, was the evident desire on the part of their proprietors to conceal them from view, and this is shown in the prevailing custom of building in secluded spots, and in imitating, as accurately as possible, in the architecture, the general appearance of the surrounding rocks. In many cases, indeed, this simulation of texture and color has been rendered so perfect, that the ruins are entirely over-looked, unless brought to view through a field-glass.

Clearly, then, there must have been a cause for these precautions. The empire was invaded by a foreign foe, and the people gradually forced southward; fleeing to the rocks at first, for refuge, but finally retiring before the advance of a powerful and cruel enemy. This fact is made more evident by the presence of great numbers of arrow-points and war-like weapons, in the

immediate vicinity of all of the larger remains. Great battles had been fought, and each stronghold was given up only after a prolonged and valiant resistance.

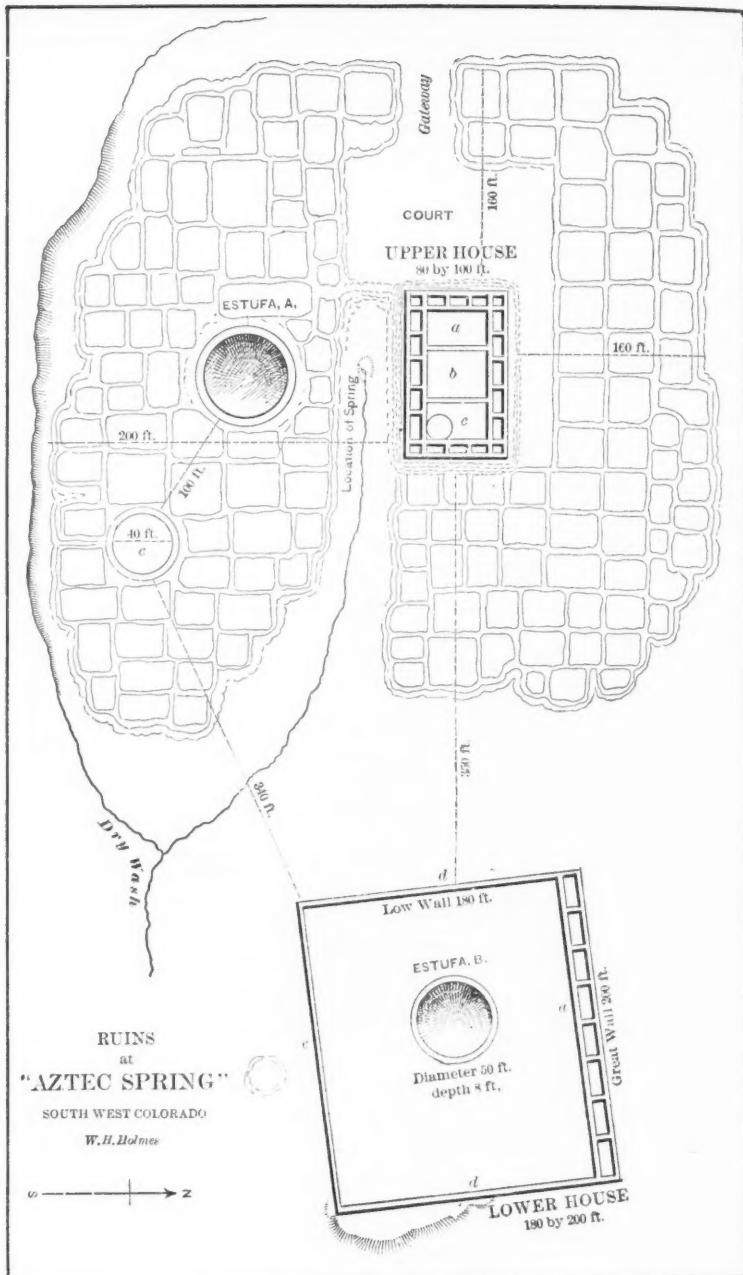
In the extreme south-western corner of Colorado stand the ruins of a once populous settlement, which we will call *Aztec Spring*. The débris of the destroyed city, covers an area some 600 by 800 feet in extent. The majority of the walls of the smaller houses near the out-skirts have crumbled away and now present nothing to the view but scarcely distinguishable mounds, or lines of original foundation. The houses had been built of different shapes, usually quadrilateral or circular, and were generally of small size, containing as a rule but one room. At the northern end of the *pueblo* or town, however, portions of the walls of two immense parallelogramic valley structures are still standing, whose surroundings seem to indicate that they had been erected with a view to the mutual protection of a large number of people, and for the purpose of resisting a protracted siege. They had been placed side by side, facing almost due north, with a space between them of several hundred feet. The northern circumvallations at present, reach a height varying from eight to eleven feet, while the remaining sides and the interior partitions lie in a jumbled mass of decay. This is owing to the fact that the latter were constructed of adobe. The northern faces, only, were built of stone. (See Plate III, for ground plan of the village. This and the other illustrations were kindly loaned by Prof. Hayden.)

Over all, a gnarled vegetation has sprung up, consisting of Cacti, Artemisia or sage-brush, and almost impenetrable thickets of grease-wood.

The stones had been cut symmetrically into rectangular blocks, and evenly dressed with stone implements; the pieces averaging a foot in length, four to six inches in thickness, and half a foot in breadth, being usually so laid that those of one layer, would break joints with those of the next above and below. The mortar with which the walls had been cemented, was simply an adobé clay, but as this contained some calcareous dust from the powdered limestones which occur in this locality, it has in time become as hard as the stones which it joins together. The edges of the blocks, as well as the surface of the plaster have been wearing away for centuries beneath the disintegrating action

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PLATE III.



of the elements, yet the remaining walls, which measure nearly three feet in thickness, are as firm as ever, and will in all probability thus continue for hundreds of years to come. In the distance, the great Mesa Verde (the green plateau) rises a thousand feet and stretches away for many miles to the north and east. It was from these cliffs that the blocks of stone in the neighboring ruins were cut and carried a distance of two or three miles.

A short distance below these remains and in the dry *arroyo* or cañon, locally known as the Rio McElmo (or, more properly, the Rio McElmell) is noticeable, in passing along the trail in the valley, the lower portion of a dark-brown circular tower, built far up among the rocks of the neighboring bluff, on a large boulder, at the brink of a sheer precipice, (Fig. 1).



Fig. 1. Watch Tower on the Rio McElmo.

A very ancient path, now almost obliterated, leads up to the ruin. The structure, as well as the rock on which it stands, is

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about ten or twelve feet in diameter, and the walls of the former may still reach a height of ten feet. This was undoubtedly used as a watch-tower by its builders, and the situation chosen for it was an admirable one for overlooking the gulch many miles both above and below. From this point, signals could be telegraphed to distant stations, in times of danger, while the miniature castle itself was so sheltered by the surrounding trees and débris as to escape the notice of careless observers.

The natural depression through which winds the parched bed of the Rio McElmo is particularly rich in all varieties of these architectural relics. In the vicinity of the ruins just described, and near the Utah border, is a peculiarly interesting cluster of fortifications. A mass of dark-red sandstone, a hundred feet in height, stands in the midst of an open plain, on the top of which the remnants of several walls are still visible. Around the base of the jagged butte are other indications of masonry, but the most perfectly preserved portion of the group is a rectangular apartment, built half-way up in the northern face of the boulder, which has been named *Battle rock* or *Legendary butte*, because a legend exists amongst some of the tribes of that section relative to a great battle which had been fought there (Fig. 2).

In the immediate neighborhood of Battle rock may be seen a series of diminutive cave dwellings or store-houses. The natural caverns of the crumbling sandstones, formed by atmospheric erosion, were utilized by the Ancient Pueblos as they retreated southward. Little hollows scarcely exceeding six feet in diameter, were walled up at the mouths and occupied possibly as dormitories, or, more probably, as magazines or *caches*, in which provisions were stored for safe keeping. Scores of these are found through all of the adjacent cañons, and in many instances they are situated hundreds of feet above the beds of the streams and were originally approached by niche-steps cut in the perpendicular cliffs, but which have been so worn away by time that they no longer present foot-holds for the adventurous climber.

If we advance in a westward direction some fifteen miles, to the dry valley of the Hovenweep (the name signifying, in the euphonious tongue of the Utah Indians, *deserted cañon*) we shall discover another large ruined structure, built on a miniature mesa or plateau in the center of the valley, rising to a height of fifty feet. On this the walls of a fortress or community dwelling are

heaped together, extending for a horizontal distance of two hun-

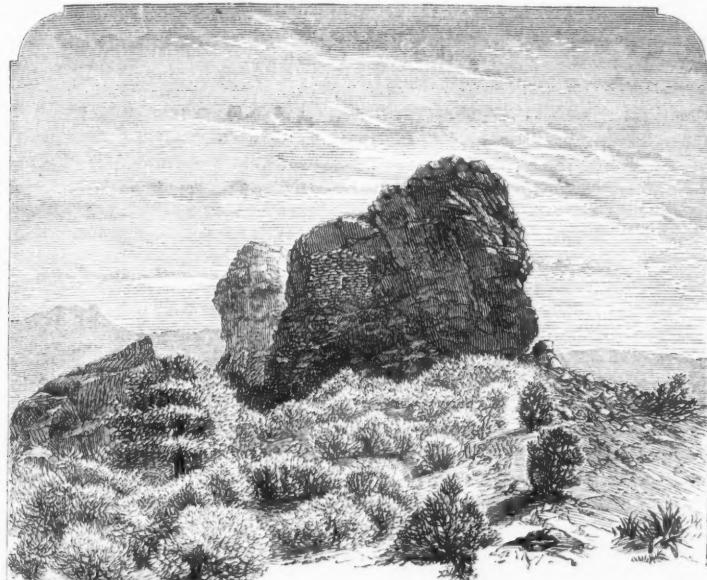


FIG. 2.—Battle Rock.



dred and seventy-five feet. At some points they still remain standing twelve feet in height, whilst at others they have entirely fallen away. Many of the external corners of the rooms were neatly and accurately curved, (see Fig. 14, Plate IV). In the plaster, the impressions of knuckles, finger-tips and nails are quite distinct, and in some instances, the very delicate lines of the epidermis are distinctly visible in the prints.

We cannot doubt that a multitude of workmen were employed in masonic labor, for in order to construct such huge edifices, a great amount of manual labor would be required, in the transportation of stone for many miles, trimming it into blocks, laying it in the walls, preparing the mortar, cutting cedar beams and rafters, plastering the external or internal walls with a coating of adobe, etc., and these operations may have required, in many cases, years for the completion of a single building. When we consider

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the difficulties with which these pioneer architects had to contend, resulting from the imperfection of their stone implements, in the absence of any metal tools, we are filled with wonder and admiration in viewing the results of their patient labor.

A remarkable cliff-house was discovered in the cañon of the Mancos river, a northern tributary of the San Juan, in the summer of 1874. Mr. W. H. Jackson, the photographist of the expedition, thus describes it: "Just as the sun was sinking behind the western walls of the cañon, one of the party descried far up the cliff, what appeared to be a house, with apertures indicating two stories, but so far up that only the very sharpest eyes could define anything satisfactorily, as we had no field-glass with the party. The discovery of this, so far above anything heretofore seen, inspired us immediately with the ambition to scale the height and explore it. The house stood upon a narrow ledge, which formed the floor, and was overhung by the rocks of the cliff. The depth of this ledge was about ten feet, by twenty in length, and the vertical space between the ledge and overhanging rock some fifteen feet. It was perched up in its little crevice like a swallow's nest, and consisted of two stories, with a total height of about twelve feet. The only sign of weakness was in the bulging outward of the front wall, produced by the giving way or removal of the floor beams. Most peculiar was the dressing of the walls of the upper and lower front rooms; both were plastered with a thin layer of some firm cement of about an eighth of an inch in thickness, and colored a deep maroon-red, with a dingy white band eight inches in breadth, running around floor, sides and ceiling. In some places it had peeled away, exposing a smoothly dressed surface of rock." (Plate IV, Fig. 12).

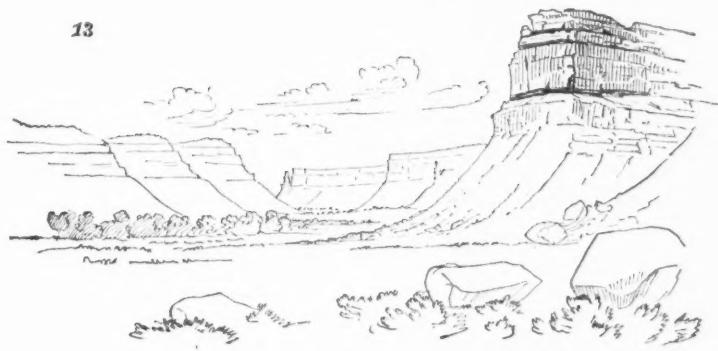
Such are the outlines of a pen picture of an isolated ruin which has attracted, since its discovery, much attention, both at home and abroad. A number of clay models have been recently made of it, which have been placed in several of the most famous museums in Europe. It already figures in some of the standard works on the aboriginal inhabitants of North America,¹ and is considered one of the most unique specimens of ancient architecture thus far discovered in this section. The illustration will give a general idea of the house itself, but in order to realize its position in the cañon, a vertical distance of 800 feet must be

¹ *Vide* Bancroft's Native Races of the Pacific States, Vol. IV, p. 721.

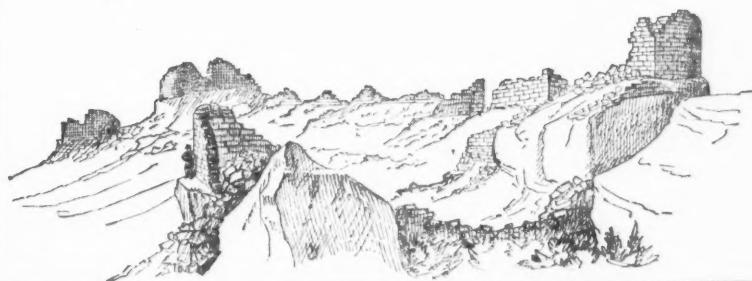
PLATE IV.



13



14



536 *The New Carpet Beetle—Anthrenus Scrophulariae*, [August, imagined, separating it from the level of the Mancos river flowing at the foot of the precipice.

The remains of an old tower are to be seen in the valley below, the walls of which are several feet in height, having the plaster crumbled almost entirely away from the interstices between the stones. The mounds of decay which lie within and without, show conclusively that the building at one time was many times as high as it now appears. In the vicinity quantities of highly glazed and ornamented pottery lies scattered around, but all of it in a fragmentary condition.

Through the neighboring cañons occur thousands of these interesting mural remains, but space forbids the mention of more than a few of the most characteristic.

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THE NEW CARPET BEETLE—ANTHRENUS SCROPHULARIÆ.¹

BY J. A. LINTNER.

DURING the summer of 1874, notices appeared in various newspapers of the ravages of a carpet-beetle, quite different in its appearance and in the character of its depredations from the well-known carpet-moth, *Tinea tapetzella*, which for so long a time had been the only known insect depredator on our carpets.

Its *habitat* was stated to be beneath the borders of carpets where nailed to the floor, eating in those portions numerous holes of an inch or more in diameter. Occasionally it made its way into the crevices left by the joinings of the floor, following which, entire breadths of carpet would be cut across as by scissors. In several instances carpets had been destroyed—new ones as readily as older—and it was questioned whether their use could be continued, in view of a prospective increase of the alarming ravages.

The insect was new to every one, and no one could form a rational conjecture as to what order of the *Insecta* it belonged. It was described as a small ovate object, about one eighth of an inch in length, thickly clothed with numerous short bristle-like hairs, and terminating in a pencil of these, forming a tail. It was exceedingly active in its motions, and when disturbed in its con-

¹ From advance sheets of the Thirteenth Annual Report on the New York State Museum of Natural History.

cealment would glide away beneath the base-boards or some other convenient crevice so quickly as in most instances to elude capture for its closer inspection. They were found only during the summer months.

In 1876 it was reported in many dwellings in Schenectady, and in the month of July examples of it, for the first time, came under my observation, taken, upon search having been instituted, under the carpets of my residence at Schenectady, where its presence had not been suspected. It was evident, on the first inspection, that it was the larva of a beetle, and in all probability a member of the very destructive family of *Dermestidae*, which comprises several of our most injurious depredators on animal substances.

A number of the larvae were secured and fed upon pieces of carpet in order to rear them. In September they had evidently matured, and had assumed their quiescent pupal state within the skin of the larva, first rent by a split along the back for the escape of the perfect insect. At this stage they presented characters which led me to refer them, in all probability, to the genus *Anthrenus*.

In October, the first perfect insect emerged. Being entirely new to me, they were sent to Dr. LeConte, the distinguished coleopterist of Philadelphia, for determination. He returned answer that they were the *Anthrenus scrophulariae* Linn.—a species well known in Europe for its destructiveness, but now for the first time detected in this country.

Notice of the discovery was communicated by me to the Albany Institute at its meeting of October 17, 1876, and a report of the same published in the *Albany Argus* of October 21st. Owing to the interest attached to the introduction in our country of another addition to the already formidable list of injurious insects of European origin, the paper, or extracts therefrom, appeared in several of the journals of this and adjoining States. Through the publicity given it, I became informed of the presence of the insect in many localities in New York and other States. Examples of a beetle, believed to conform to the brief description which I had given of *A. scrophulariae*, and known to possess the like habit of feeding upon carpets, were sent to me by Mr. A. S. Fuller of the *Rural New-Yorker*, for comparison. The species had been in his cabinet for some time, under the name of *Anthrenus lepidus* LeConte, having received the first

examples from Oregon in 1871 or 1872. Later, in 1874, specimens referred by him to the same species were found abundantly in a dwelling in Market street, New York, and thereafter in various parts of the city and neighboring localities. The examples reared by Mr. Fuller from larvae taken in New York city were clearly identical with *A. scrophulariae*. Upon informing Dr. LeConte that examples of this species were in cabinets under the name of *A. lepidus* and requesting an explanation, he wrote me that the latter name had been given by him to a form which he had found on flowers at San Francisco and San Jose in 1850;¹ that it differed from the *A. scrophulariae* of Europe in its sutural line being white instead of red; but that in all probability it should only be regarded as a variety of the European species.

Dr. LeConte suggests that it may have been imported into California from Southern Europe during the Spanish occupation of that country. The eastern invasion of the insect, he believes to have been within a few years through the importation of carpets at New York.

The accompanying figures, very faithfully drawn by Prof. Riley, represent *A. scrophulariae* in three of its stages, viz: *a* the larva, *c* the pupa, and *d* the imago or beetle. At *b* the skin of the larva, after the beetle has emerged from the fissure on the back, is shown. The figures are enlarged, the lines beside them representing the natural size.

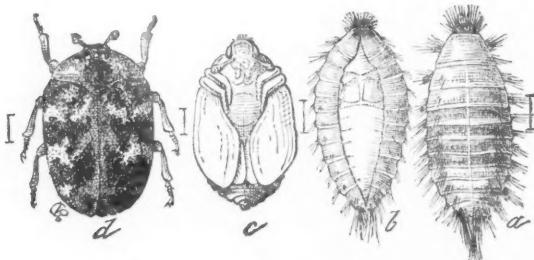


FIG. 1.—The New Carpet Beetle.

The larva—the form in which it is usually found when pursuing its ravages beneath the carpets—measures, at maturity, about

¹ *A. lepidus*, breviter ovatus, supra niger, thoracis lateribus albo-squamosis, gutta nigra inclusa, elytris fasciis tribus angustis suturaque albo-squamosis, macula antica suturali aureo-squamosa ornatis, basi parce albo-squamosis. Long. .11 in San Diego, Cal.—*Proc. Acad. Nat. Sci., Phila.*, 1854, p. 112.

three-sixteenths of an inch in length. A number of hairs radiate from its last segment in nearly a semicircle, but are more thickly clustered in line with the body, forming a tail-like projection almost as long as the body; this terminal pencil of hairs is not shown in its full extent in the figure, doubtless taken from an immature individual. The entire length of the insect, including the pencil of hairs, is, in the largest specimens, nearly three-eighths of an inch. Measured across the body and the lateral hairs, its breadth just equals the length of the body. An ordinary magnifier will show the front part of the body, where no distinct head is to be seen, thickly set with short brown hairs, and a few longer ones. Similar short hairs clothe the body—somewhat longer on the sides, where they tend to form small tufts. Towards the hinder end may be seen on each side three longer tufts (thrice as long) projecting laterally; but these are not always visible, as the insect by the aid of a peculiar muscular arrangement, has the power of folding them out of sight along its sides. The body has the appearance of being banded in two shades of brown—the darker band being the central portion of each ring, and the lighter, the connecting portion of the rings, known as the incisure. By turning it upon its back, the six little legs, of which it makes such good use, can be seen, in vigorous efforts to regain its former position—its struggles while in this condition sometimes producing a series of jumps of about an eighth of an inch in length.

Having attained its full growth, it prepares for its pupal change without the construction of a cocoon or any other provision than merely seeking some convenient retreat. Here it remains in a quiet state, unaltered in external appearance, except somewhat contracted in length, until it has nearly completed its pupation, when the skin is rent along its back, and, through the fissure, the pupa is seen. A few weeks having passed, the pupal skin in its turn is split dorsally, and the brightly colored wing-covers of the beetle are disclosed. Still a few additional days of repose are required for its full development, when the now fully matured beetle crawls from its protective coverings of pupal case and larval skin, and appears in its perfect form—its final stage.

The earliest beetles emerge in the month of October, and continue to make their appearance during the fall, winter and spring months. Soon after their appearance probably, they pair, and the

540 *The New Carpet Beetle*—*Anthrenus Scrophularie*. [August,
females deposit their eggs for another brood of the carpet-eating
larvæ.

The beetle is quite small, smaller than would ordinarily be expected from the size of the larva, being only about one-eighth of an inch long by one-twelfth broad. An average of five examples before me gives, length .125 inch, breadth .085 inch. Its form is almost a perfect ellipse as seen from above; its back and under surface are quite rounded. When turned upon its back, it often for a few moments counterfeits death, with its legs so closely folded to the surface as scarcely to be seen, and in this state the ordinary observer might be at a loss to know the lower from the upper side.

It is a beautifully marked little insect in its contrasting colors of white, black and scarlet, arranged as follows: The edge of each wing-cover, where they meet on the back, is bordered with red (forming a central red line), with three red projections from it outwardly, one on the middle of the back, and one other toward each end. Take a straight line and divide in four equal parts by three cross lines, and we have nearly the position of these projections. At the extreme tip of the wing-covers is a widening of the bordering line, making almost a fourth projection from it. The first projection, near the head, is connected with a white spot, running upwardly on the middle of the front border of the wing-cover. On the outer border of the wing-covers are three white spots nearly opposite the red projections. The intermediate spaces are black. The segments of the body beneath are covered with pale red scales, and the thoracic region (which bears the legs) with whitish scales. The above description, although not presented as a scientific one, will suffice for the identification of the beetle when met with. The detection of this insect adds to our fauna another species of the dreaded genus *Anthrenus*, which there is reason to fear will equal in its destructive agency the well-known museum pest, the *A. varius* (formerly known as *A. museorum*), the obtrusive guest of all our collections of natural history, whose ravages it seems impossible fully to guard against, and so exceedingly difficult to control.

It does not confine itself wholly to carpets, but it also infests and injures various articles of wearing apparel, hanging in closets or lain away in drawers. An instance has also been stated, but awaits confirmation, of its preying upon cotton fabrics—a habit not attaching to either the clothes or carpet moths.

It is known to have become almost ubiquitous in a house which had been for some time occupied by it, notwithstanding the persistent efforts made for its extirpation. Its exuviae were encountered in trunks, boxes, tied-up packages, drawers, beneath floor oil-cloths, etc. Late in the season (October) clusters of twelve or more of the full-grown living larvae were disclosed, to the disgust and dismay of the housekeeper, in turning over a paillasse, the borders of which they had selected as a safe retreat on which to undergo their final transformation.

I have this present year found that a convenient place in which to discover the beetle, is upon the windows of the infested rooms during the day. In the latter part of April examples were taken upon the windows of my residence in Schenectady. After the middle of May, a systematic search instituted for them, gave several examples each day. In the six days from May 17th to 22d, forty-four specimens were taken from the three windows of two upper rooms. Should investigation show that the beetle is drawn to the windows before the deposition of its eggs, their ready capture and destruction at this time will offer an easy method of preventing their increase.

Should this insect continue to increase until its complete naturalization shall make it as common as *A. varius* (a dozen or more of which may sometimes be seen feeding on a single flower), it is difficult to conceive how, under such a visitation, the comfort of carpets can still be indulged in within our homes. Even now, when it has barely commenced its ravages, it is reported as having inflicted very serious pecuniary losses in several instances, where carpets have been entirely ruined; and such terror has its presence imparted, that not a few prudent housekeepers have already abandoned the customary nailing of their carpets to the floor, that frequent examinations may be made during the summer months for the discovery and destruction of the unwelcome guest.

The remarkable invasion of a dwelling in Cold Spring, N. Y., in the summer of 1874, after a twelve months' absence of the family in Europe, was by a larva of *Anthrenus* (as determined by Dr. Packard), which is now believed to have been this species. According to the statement made, "they took complete possession, from the cellar to the attic, in every nook and crevice of the floors, under matting and carpets, behind pictures, and eating

everything in their way." From this account we may infer an almost incalculable capability of increase if left to itself, and draw the lesson of the absolute necessity of combatting its invasion by every means in our power.

It will unquestionably prove an exceedingly difficult pest to dislodge. The ordinary applications of camphor, pepper, tobacco, turpentine, carbolic acid, etc., are powerless against it. It has even been asserted that it "grows fat" on these substances. An effectual means of destruction, and preventive against new invasions, is still to be discovered. The free use of benzine has been recommended in some of our journals, to be used in the saturation of cotton, with which to fill the joinings of the floors and crevices beneath the base-boards. This is to be done during the winter months, at which time the insect will be occupying these retreats, either in its perfect beetle form, or as eggs deposited for another brood; to either of these the direct application of benzine would be fatal. To some of my correspondents I have suggested the pouring of kerosene oil in the crevices of the floors, and filling of all places of retreat with cotton saturated with the oil. I would regard this as less dangerous in its use than benzine, and equally efficient.

The recommendation recently made in several of our newspapers, of the Persian insect-powder for the destruction of the insect, I believe to be of no value. I have not deemed it worth the trouble of experimenting with, but I have been told by those who have given it a trial that it has been found to be of no avail whatever.

The insect has not as yet become sufficiently abundant in New York to be found resorting to plants for its food. The variety *Anthrenus lepidus*, which was introduced in California sufficiently long ago to permit its complete naturalization, was discovered there, in numbers, feeding upon some of the Compositae. The *Anthrenus varius* is often found, in its perfect state, taking its food from the blossoms of different plants in the garden or field. I have met with it abundantly on peonies. It has also been found to frequent the rocket flower, *Hesperis matronalis*, a fragrant and showy perennial. If the plants known to be attractive to the *A. varius* can be introduced into our houses, and made to flower during the months of April and May, I believe that the carpet-beetles would be drawn to them in preference to windows, perhaps as soon as they emerge from the pupæ.

We are unable to give at the present any precise statement of its distribution. It is known in Oregon, as well as in California. It is believed to be distributed throughout most of the western States, and it is known to occur in various portions of the State of New York. It is announced as having appeared in considerable force in Syracuse. In Utica it has inflicted serious damage in many dwellings. From Brockport the information is received that "it has been very destructive for the last three years. In spite of all the means which can be used, it is increasing in number, and threatens to destroy the carpets and all other woolen goods." It has occurred at Buffalo, but not so abundantly as to have originated the name sometimes applied to it—the *Buffalo bug*—a name given to it on the Pacific coast probably, from a fancied resemblance to that animal. Its presence has also been detected in Albany, but no serious ravages have been reported. It has occasioned much alarm in several places in the State of New Jersey. Without doubt it is committing its depredations in many localities where its work is ascribed to the carpet-moth, than which it is a far more pernicious insect.

A lady to whom I was relating the destructive capabilities of the new pest, congratulated herself that her carpets were free from it. The following morning her husband brought to me a beetle which he had taken from his face during the night, which proved to be the creature that I had described to her the previous evening—the abundant presence of which in her home, she had not suspected.

From the serious nature of its depredations as above referred to but in part, the secrecy with which it conducts them, the extreme difficulty with any known appliance of eradicating it—it becomes very important, as a preventive against its alarming increase, that it should, from the outset, be combatted by all the means known to be efficacious against its allied forms, or which may give promise of success as against a new foe.

It may be interesting, in connection with the above notice of this last importation, to recall the fact that nearly all of our most injurious insects have been introduced from Europe. Of a long catalogue given by Professor Riley, in one of his valuable reports, a few may be mentioned here:

The Hessian-fly (*Cecidomyia destructor*), the wheat-midge (*Diplosis tritici*), the cheese-maggot (*Piophila casei*), the house-fly

[August,

(*Musca domestica*), the currant-worm (*Nematus ventricosus*), oyster-shell bark-louse (*Aspidiotus conchiformis*), several species of plant-lice (*Aphides*), the cockroach (*Blatta orientalis*), the croton-bug (*Ectobia germanica*), the meal-worm (*Tenebrio molitor*), the grain-weevil (*Sitophilus granarius*), the bee-moth (*Galleria cereana*), the codling-moth of the apple (*Carpocapsa pomonella*), the cabbage-moth (*Plutella cruciferarum*), the carpet-moth (*Tinea tapetella*),¹ the clothes-moth (*Tinea vestianella*), the fur-moth (*Tinea pelionella*),¹ the currant borer (*Egeria tipuliformis*), and within the few past years, the asparagus-beetle (*Crioceris asparagi*), and the well-known destructive cabbage-butterfly (*Pieris rapae*). All of these, and the formidable list might be greatly extended, we have received from Europe, while very few of our native insect pests have been sent in return. Should our late exportation of the Colorado potato-beetle (*Doryophora decemlineata*), prove as injurious in Europe as in this country, which there is much reason to doubt, we shall still be very far from having made a commensurate return. While the few American species which have been introduced in Great Britain and on the continent have not spread to any great extent, in almost every instance where injurious insects have been brought thence to this country, their number and their ravages have been greatly increased. Thus, while the recent advent of the *Anthrenus scrophulariae* has brought consternation in many of our homes, we have been unable to find any record of its preying upon carpets, or other woolens, in the Old World, where it has been so long known. Even special inquiry made by me of one of the leading Entomologists of Europe, has failed to elicit any such information. It is said there to infest dried meats and similar substances. Perhaps its fondness for carpets is a new taste which its transportation hither has developed.

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RECENT LITERATURE.

EMERTON'S STRUCTURE AND HABITS OF SPIDERS.²—This is eminently a book for boys and girls who are in any way interested in natural history, as it is a simple, readable, thoroughly intelligible account of the external and internal structure of spiders, with their classification; while, as an account of the more

¹ Mr. V. T. Chambers finds differences in these two species from the European ones (*Canadian Entomologist*, 7, pp. 124, 125).

² American Natural History Series, vol. 2. *The Structure and Habits of Spiders.* By J. H. EMERTON. Illustrated. Salem, S. E. Cassino, Naturalists' Agency, 1878. 12mo, pp. 118.

striking habits, indoors and out, of these interesting creatures, it is the best and most original book in our language. Lending a great charm and interest are the original photo-electrotypes, many illustrating the spiders in the process of spinning their webs, laying their eggs, and showing the various forms of nests and cocoons for housing the eggs. The naturalness of the drawings, especially those of the spiders standing on tip-toe (viz.: Figs 40, 41, 42); of the spiders laying eggs (Figs. 56, 57, 58, 59, 60), have certainly never been surpassed. In all these matters our author's many years' observations of spiders and their ways, and his facile pencil, as seen not only in the drawings of the entire spiders, but also the anatomical details, give this little book the air not only of the work of an adept in the difficult art of observation, which makes the book thoroughly popular and interesting to the young, but it is really, in its way, an admirable, authoritative monograph.

The figure (8) on page 20, illustrating in a general manner the internal anatomy of a spider, is a most successful drawing, and not surpassed for clearness and intelligibility. We congratulate the author on the success of his first literary venture, and the publisher on the beautiful and tasteful dress of the book, and trust that the remainder of the series will add to the number, now so small, of American books for American boys and girls, which shall not only instruct but attract them strongly to the study of nature in the fields and woods, or at least out of doors.

Our main cause for fault-finding with Mr. Emerton's book is that there is not more of it. At times he is too brief; fifty pages more would have added to its value, and in some places he might have entered into longer explanations without wearying his readers. On page 12 we should have preferred the word cephalothorax, or head-thorax, instead of thorax. There is little in the book which is not original, most of it will be quite new to naturalists, and we anticipate that it will give a fresh stimulus to the study of spiders, which have such highly-developed reasoning powers, and which, the more we know them, become the more interesting, despite their repulsive exterior and often disagreeable manners.

THE NATURALISTS' DIRECTORY FOR 1878.¹—The title given below so well characterizes this useful publication that we need but call attention to a new feature in the work, viz., the addition of a list of scientific societies, clubs, museums, etc., in the United States and Canada, with the addresses of the Presidents and Secretaries. Though on casual examination we notice one or two errors, the work of compilation, difficult enough to perform

¹ *The Naturalists' Directory for 1878*, containing the names of the Naturalists of America north of Mexico, arranged alphabetically, and by departments; also a list of scientific societies, and a catalogue of obtainable scientific books, arranged by subjects. Edited by SAMUEL E. CASSINO. Salem, Naturalists' Agency, 1878. 12mo, pp.

without omissions, has been apparently well done, and it remains for those whose names are mentioned in it to keep the Editor informed as to the changes in residence, &c.; in this way a work in which all are interested may be well maintained.

HAYDEN'S GEOLOGICAL AND GEOGRAPHICAL ATLAS OF COLORADO.¹—The publication of this noble work is appropriate at the present time, as indicating that our government, although subject to the vicissitudes so incident to its popular form, does not forget the highest interests of the people. The great survey under Dr. Hayden, of which the present atlas is the latest product, appeals in it to the public interest in the most direct manner. Nothing can be more desirable for a community to know than the material constitution of their possessions, and in no way is this knowledge more quickly and exactly communicated than by the geological map.

This atlas consists of sixteen folio maps, in two series. The first of these consists of four maps on a scale of twelve miles to the inch; the second of twelve sheets on a scale of four miles to the inch. Of the second series, six maps are topographical and six geological. The maps of the first series include a drainage map and a map indicating the distribution of vegetation. The importance of the latter to the emigrant is alone worth the cost of the atlas. The topography is expressed by contour lines representing intervals of two hundred feet, which is the best mode of expression of surface configuration. The various types of country are thus perceived at a glance; the craggy peaks, the plains and the cañons being as well marked as in a birds-eye view.

In the geological department Dr. Hayden's work is prominently displayed. The vast series of Mesozoic and Tertiary strata which form the central district of our continent were first distinguished, located and stratigraphically defined by the author, who has now the satisfaction of seeing his prolonged labors set forth in a form commensurate with their importance, so far as regards the great State of Colorado. No more extensive area, horizontally or stratigraphically, ever fell to the lot of a single geologist to translate into the language of science, than has been, for the past twenty-five years, the heritage of Dr. Hayden. The grandeur of the result may be estimated by remembering that the present atlas covers a very small fraction of the area explored and digested. An examination of the present series of maps will furnish some idea of the labor and energy expended in the work. We have here the results of the studies of Dr. Hayden's able corps of assistants as well as of his own. Of these gentlemen it would be invurious to select any for special mention. The suc-

¹Geological and Geographical Atlas of Colorado, and portions of adjacent territory. By F. V. HAYDEN, U. S. Geologist-in-charge, Department of the Interior, United States Geological and Geographical Surveys of the Territories, 1877.

cess of the atlas as a work of art reflects equal credit on the artist and engraver. An especial feature of the work, as of many of Dr. Hayden's reports, is the analytical landscapes of Mr. Holmes. These representations, which conclude the atlas, enable the reader to realize, by a vertical projection, the teachings of the preceding maps and charts.

Every citizen of our country will feel increased respect for his government, which fosters works like the present; and the complaint that a republican form is discouraging to the development of science within its limits is shown every day to be without foundation.

THE PENN MONTHLY for June, 1878.—This magazine deserves well of the thinking community as an enterprise for the dissemination of fact and argument in all questions of the highest moment. The present number contains an article which interests us especially, entitled, "The relation of the Mosaic Cosmogony to Science," by C. B. Warring, Ph.D. It is another attempt to reconcile the account of creation, given by Moses in the first chapter of Genesis, with the facts which have been ascertained by investigation, and which form the branches of science known as geology and paleontology.

Mr. Warring approaches the subject in a judicial spirit, and with an evident desire to ascertain the truth of the matter. He is careful to disavow responsibility for the statement of many friends of the Mosaic record, which cannot be substantiated by the text. He also admits the validity of the conclusions attained by scientific men in physics and geology. These conclusions he arranges under twenty heads, commencing with the former department and ending with the latter. These are fairly stated, but we leave to our friends the physicists the assertion that light is the primal form of motion and force, and the new theory propounded by the author which accounts for the glacial epoch and the climatic zones, by supposing a pre-glacial change in the direction of the earth's axis of 22° . A closing statement of this part of the subject, which is derived from Dana, is open to such doubt as to be invalid as evidence: it is, that "every fish, bird, reptile and mammal of the Tertiary is now extinct."

The general coincidence of the Mosaic account with these facts is then displayed, in so far as they relate to the earlier and middle portions of geologic history. That such a similarity between the two records exists, is a well-known fact, and one which assures to Moses' cosmogony the first place among those which have come down to us from ancient times. Whether, however, the coincidence is sufficiently exact to warrant the high estimate placed upon it by many theologians, and the assertions made as to its supernatural origin, is a very different matter. In discussing this part of the subject, our author is not free from

bias, which we think he displays in a disposition to see more scientific precision in the language of Moses than a plain reading of the text will permit.

First, as to the statement that the Mosaic account "does not speak of any vegetation, except seed-yielding herbage and trees whose fruit enclosed the seed." We think that the text will not bear this restricted interpretation. It says, "Let the earth bring forth grass, the herb yielding seed and the fruit tree yielding fruit after his kind, whose seed is in itself, upon the earth." It is, to our mind, a gratuitous assumption, that the language "whose seed is in itself," signifies vegetation "whose fruit encloses the seed," or angiospermous plants. But even supposing this to be the rendering of the text, the seeds of gymnospermous plants are enclosed in the unripe cones for a considerable time, and to ordinary observation the opening of the cones at maturity does not differ from the same process in a seed vessel. By claiming too much morphological meaning for the text, Mr. Warring taxes our credulity too seriously. What he further understands by the language "herb yielding seed," will appear later; for us, it means any kind of vegetable whatever.

Second, we note the relation of this Mosaic statement to the facts of vegetable palaeontology. The author of the article, finding that the angiospermous plants have not yet been found below the Cretaceous horizon, concludes that Moses referred to this period when describing the creations of the "third day." He evidently thinks that Moses intended phænogamous plants in the expression, "herbs yielding seed," that is, that he distinguished seeds from the spores of cryptogamic plants. Here again he goes beyond the legitimate use of the text. For us, Moses describes the creation of all kinds of vegetation, cryptogamic as well as phænogamic, and that any relation of the text to the history of the Cretaceous period is imaginary. Indeed, the ancient record is better supported by the liberal interpretation which we give it. But this coincidence of the enlarged interpretation with geologic history is not so remarkable as to be incapable of explanation on rational principles. In the Mosaic text the creation of plants very naturally follow the first elevation of land, as it could not have taken place earlier; and it precedes its occupation by animals, in plain accordance with the necessary existing relations of the two forms of life, as open to the view of any observing person.

Thirdly, a greater significance than the language admits of, is discovered by the author under consideration, in the verse with which the account of the third day's work opens. It reads, "Let the waters under the heaven be gathered together unto one place," "a remarkable statement," says our author, "to come from one who knew only of separate bodies of water and nothing of their real connection. We now know that the oceans are all one." For us, the latter is the more remarkable statement of the two,

implying an obscurity in the mind of its author as to the meaning of the words "one place," etc.

Fourthly; but supposing Moses to have referred to the Cretaceous period in his account of the third day, our essayist labors under the difficulty of having admitted that the creation not only of plants but of all the greater and many of the minor divisions of the animal kingdom took place before that of the sun and moon on the fourth day. And if we allow the utmost freedom to the commentator and understand the text to mean before the *appearance* of the sun and moon to the inhabitants of the earth, we have an equally impossible proposition.

The author leaves for another article his explanation of the relation of the "days" to the geologic record. Here he will have a more difficult task before him than that which he has already attempted. The order of succession indicated by Moses is, in general, correct, but the division into epochs is not only not in accordance with the facts now in our possession, but is not consistent with itself. Thus the introduction of "fowl" on the first day of the animal creation is far from justifiable, as is also the creation of "whales" at the same time. These forms were comparatively late creations, and if the language "every living creature that moveth, that the waters brought forth," means the first animals, as its place in the same text indicates, then we have another serious anachronism. If, on the other hand, this sentence is to be disregarded, then there is no narration of the origin of animals. Then again, the time of origin of "everything that creepeth upon the earth after his kind," whether reference is made to insect or reptiles, comes on the sixth day, and after the creation of birds and whales, instead of anterior to them, as the science of palaeontology clearly shows to have been the case. In fact there is no general difference between the proceedings of the fifth and sixth days beyond that indicated by the habitat of animals, *i.e.*, whether they be aquatic or terrestrial; and this distinction is only valid as relates to one class, the fishes, but has no significance otherwise, and least of all any agreement with the geologic record.

HAECKEL'S PROTISTA-KINGDOM.¹—This is a strong reaffirmation, in popular language, of Haeckel's belief in a kingdom of organisms, comprising certain protophytes and the Protozoa, which forms neutral ground between the animal and vegetable kingdoms. It seems to us to be an unnatural and unnecessary combination, though from some points of view useful at this time. The illustrations are excellent. The right of *Bathybius* to be regarded as an organism is stoutly maintained. The pamphlet deserves translation into English, for whatever Haeckel writes is worth reading, whether all his conclusions are accepted or not. He is a force in the scientific world; certainly not a protist.

¹ *Das Protistenreich, Eine populäre Uebersicht über das Formengebiet der niederen Lebewesen. Mit einem wissenschaftlichen Anhang: System der Protisten.* Von E. HAECKEL. Mit zahlreichen holzschnitten. Leipzig, 1878. 8vo, pp. 104.

ANNUAL RECORD OF SCIENCE AND INDUSTRY FOR 1877.¹—While this year's volume is less bulky than its predecessors, it has lost none of its distinctive features as a useful summary of the progress of science in all departments, with especial reference to the wants of the specialist who must be informed as to progress in general science, as well as of the general reader who needs some handy, condensed year-book of this sort, to supplement the encyclopædia and other books of reference in his library. The work seems to be admirably classified and condensed and in all respects as useful and rather more compact, and cheaper than the previous ones.

COOK'S MANUAL OF THE APIARY.²—This manual of bee-keeping is in point of style not equal to Langstroth's or Quimby's, but still is excellent in its matter and will prove a reliable and practical guide to the beginner. The illustrations are in most cases good, in others mediocre, but still they are numerous, and unusual prominence is given to physiological and anatomical facts and theories. The index is copious and convenient.

THORELL'S STUDIES ON THE SPIDERS OF MALAYSIA.³—The first part of this series of descriptions of the Arachnid fauna of Malaysia, and of the Celebes especially, forms a volume of 294 pages, with an index, and must comprise when completed a quite full description of the spiders of Malaysia and Pupuana. The descriptions are detailed and in Latin.

RECENT BOOKS AND PAMPHLETS.—Brehm's Thierleben. Band x. Heft 7-10. Leipzig, 1878. New York: B. Westermann & Co. 8vo, 40 cents a Heft.

Die europäischen Encyrtiden. Von Gustav Mayer. Wien, 1878. 8vo, pp. 104. Beiträge zur Schmetterlings-Fauna von Surinam, II. Von N. B. Möschler. Wien, 1878. 8vo, pp. 72, 3 plates. From the author.

Entomological Contributions, No. iv. By J. A. Lintner. From the Thirtieth Annual Report on the New York State Museum of Nat. History, for the year 1876. Printed in advance of the Report. Albany, June, 1878. 8vo, pp. 142.

Studi sui Ragui Malesi E. Papuani per T. Thorell. I. Genova Tipografia del R. Instituto Sordo-muti, 1877. 8vo, pp. 297. From the author.

American Club List and Sportsman's Glossary. By Charles Hallock. New York: Forest and Stream Publishing Company. 1878. 8vo, pp. 90.

Two interesting American Diptera, *Glutops singularis* and *Epibates Osten-Sackenii*. By Edward Burgess. From the Proceedings of the Boston Society of Natural History. Vol. xix. February 27. 1878. 8vo, pp. 2, with a plate. From the author.

Report on the Insects (including Arachnida) collected by Captain Feilden and Mr. Hart between the parallels of 78° and 83° north latitude, during the Recent Arctic

¹Annual Record of Science and Industry for 1877. Edited by SPENCER F. BAIRD, with the assistance of Eminent Men of Science. New York, Harper & Brothers, 1878. 12mo, pp. 480.

²Manual of the Apiary. By A. J. COOK, Professor of Entomology in the Michigan State Agricultural College. Second edition, revised, enlarged, mostly rewritten and beautifully illustrated. Chicago: Thos. G. Newman & Son, 1878. 12mo, pp. 286.

³Studi sui Ragui Malesi e Papuani. Per T. THORELL. I. Genoa, 1877. 8vo, pp. 294, and index.

Expedition. By Robert McLachlan, F.R.S., F.L.S. (Extracted from the Linnean Society's Journal—Zoölogy. Vol. xiv.) 8vo, pp. 25. From the author.

Das Protistenreich. Eine populäre Uebersicht über das Formengebiet der niederen Lebewesen. Mit einem wissenschaftlichen Anhange: System der Protisten. Von E. Haëckel. Leipzig: Ernst Günther's Verlag, 1878. 8vo, pp. 104. Mit zahlreichen Holzschnitten.

Die europäischen Cynipidengallen mit Ausschluss der auf Eichen vorkommenden Arten. Von Dr. Gustav Mayer. (Aus dem 15. Jahresberichte der Rossauer Comunal—Oberrealschule in Wien.) Wien: Alfred Nölder, k. k. Hof-und Universitäts-Buchhändler, 1876. 8vo, pp. 22, 3 plates.

The Ganoid Fishes of the British Carboniferous Formations. By Ramsay H. Traquair, M.D., etc. Part i. *Palaeoniscide* 4to, pp. 1–60, plates i–vii. (Palaeontographical Society, London.) Volume for 1877. From the author.

Beiträge zur Fossilen Flora Spitzbergens, gegründet auf die Sammlungen der Schwedischen Expedition vom Jahre 1872 auf 1873. Von Oswald Heer. 4to, pp. 141, plates 32. Stockholm, 1876. From the author.

Palaeontographica. Beiträge zur Naturgeschichte der Vorzeit. 25te Band oder 3te folge. Erster Band 4te Lieferung. 4to, pp. 141–174, plates xix–xxii. Cassel, 1878.

On the Structure and Development of the Skull in the Urodeous Amphibia. Part i. By Wm. Kitchen Parker, F. R. S. 4to, pp. 529–597, plates 21–29. (From the Philosoph. Transactions Roy. Soc. Vol. 167, part 2.) London, 1877. From the author.

Zur Stammesgeschichte der Spongiens. Von Prof. Karl A. Zittel. 4to, pp. 20. (Read on the Fiftieth Anniversary of C. Th. von Siebold's Académic Doctorate.) Munich, 1878.

Studien über Fossile Spongiens. Zweite Abtheilung: Lithistidae. By Prof. Karl A. Zittel. 4to, pp. 1–90, Taf i–x. (From the Abhandl. der K. bayer. Akad. d. Win. ii. Cl. xiii. Bd.) München, 1878. From the author.

Description of the Fossil Reptilia of South Africa in the Collection of the British Museum. By Richard Owen, C.B., F.R.S. 4to, Vol. i, text pp. 88, accompanied by a 4to atlas, Vol. ii, of seventy plates. From the author.

The Ancient Life-History of the Earth: a comprehensive outline of the principles and leading facts of Palaeontological Science. By H. Alleyne Nicholson, M.D., etc. 12mo, pp. 407, figures 270. D. Appleton & Co., New York, 1878.

The Naturalists' Directory for 1878, containing the names of the Naturalists north of Mexico, a list of Societies, etc. Edited by S. E. Cassino. 12mo, pp. 184. Naturalists' Agency, Salem, 1878.

Ferns of Kentucky. By John Williamson. 12mo, pp. 154, and sixty plates drawn by the author. John P. Morton & Co., Louisville, Ky., 1878.

Osteologie et Myologie des Manchots ou Spheniscides par M. M. Paul Gervais et E. Alix. 8vo, pp. 48, pls. xxvi, xxvii. Paris, 1878. From the authors.

Illinois State Laboratory of Natural History. Natural History of Illinois. Bulletin No. 2. 8vo, pp. 92, 1 plate. Bloomington, Illinois, 1878.

The Palaeontologist. N. P. James, editor. 8vo, pp. 8, No. 1. Cincinnati, July 2, 1878.

The Law of Population. Its consequences and its bearing upon human conduct and morals. By Annie Besant. 12mo, pp. 47. New York: Asa K. Butts, 19 Dey street, 1878.

On the Influence of the Advent of a higher form of life in modifying the structure of an older and lower form. By Prof. Richard Owen, F.R.S., etc. 8vo, pp. 421–430. (From the Quart. Journ. Geolog. Soc. of London for May, 1878.) From the author.

Remarks on New Zealand Fishes. By Dr. Albert Günther, F.R.S. 8vo, pp. 469–472. (From the Ann. and Magazine of Natural History, May, 1876.) From the author.

On a Collection of Reptiles and Fishes from Duke-of-York island, New Ireland and New Britain. By Dr. Albert Günther, V.P.Z.S. (Proc. Zoöl. Soc. of London, Feb. 20, 1877, 2 plates.) From the author.

Preliminary Notes on new Fishes collected in Japan during the Expedition of H.M.S. "Challenger." By Dr. A. Günther, F.R.S. (From the Ann. and Mag. Nat. History, Nov., 1877.) 8vo, pp. 433-446. From the author.

Account of the Zoological Collection made during the visit of H.M.S. "Petrel" to the Galapagos islands. Communicated by Dr. Günther. (From Proc. Zool. Soc. London, Feb., 1877.) 8vo, pp. 64-93, 3 plates.

Notice of two large extinct Lizards, formerly inhabiting the Mascarene islands. By Dr. A. Günther, F.R.S., etc. (From the Linnean Soc. Journ. Zoölogy, Volume xii.) 8vo, pp. 322-327. From the author.

Notes Sur les Schistes à Meletta de Froidfontaine. Par MM. Oustalet & Sauvage. (Ext. du Bull. Soc. Geol. de France. 2me Ser. t. xxvii, Janvier, 1870.) From the authors.

Proceedings of the Boston Society of Natural History. Vol. xix, part iii, May, 1877 to March, 1878. 8vo, pp. 223-334, plates 8, 9. Boston, May, 1878. From the Society.

Descriptions of new species of Invertebrate Fossils from the Carboniferous and Upper Silurian rocks of Illinois and Indiana. By C. A. White, M.D. (From Proc. Acad. Nat. Sci., Philadelphia, 1878.) From the author.

The ancient Outlet of Great Salt Lake. By A. C. Peale. (Am. Journ. Science, Vol. xv, June, 1878.) 8vo, pp. 439-444. From the author.

Descriptions of Seven New Species of Birds from the Island of St. Vincent, West Indies. By George N. Lawrence. (Ann. N. Y. Acad. Sciences, Vol. i, No. 5, 1878.) Pages 147-153. From the author.

Description of a new species of Parrot of the genus Chrysotis. By George N. Lawrence. (Ann. N. Y. Acad. of Sciences, Vol. i, No. 4.) Pages 125, 126. From the author.

Revista Meteorológica Mensual, Marzo, 1878. Also Boletín del Ministerio de Fomento de la República Mexicana, June, 1878. Mariano Bárcena, Director, Mexico, Mex.

Proceedings of the American Philosophical Society, No. 101, July 8, pp. 455, Philadelphia.

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GENERAL NOTES.

BOTANY.

INSECTS NEEDED TO FERTILIZE UTRICULARIA AND PYXIDANTHERA.—In a short paper read at the American Association, in Buffalo, in 1876, I showed some of the neat arrangements by which a cross-fertilization of flowers was secured in several species of several genera of plants. I now present an illustration of one of the best of these. It is the common bladderwort, *Utricularia vulgaris*, which is common in stagnant ponds. Aside from the peculiarity under consideration, there are several other things about the plant of especial interest.

Fig. 1 shows an enlarged front view of the flower with the lower tip pulled down. The lower tip of the stigma is much the larger, and when touched it bends up in a few seconds close against the upper lip of the corolla just under an arch-like projection. On visiting a flower for honey, an insect, as a honey-bee, can scarcely fail to hit the larger of the two stigmas. Farther on pollen is received on the tongue or jaws of an insect. None is likely to be left on the stigmas of the same flower, for by the

time the insect is ready to withdraw, the side of the stigma which

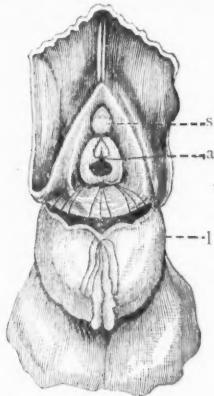


FIG. 1.—An enlarged front view of a flower of *Utricularia vulgaris*. *s*, outside of the flower after the larger sensitive stigma has closed under the ridge on the corolla. *a*, anthers. *l*, lower lip of corolla pulled down.



FIG. 2.—Side view of the same flower showing the position of the larger stigma before it has been touched by an object.

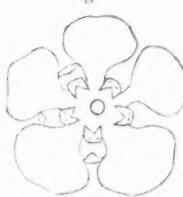
FIG. 3.—Side view of pistil still further enlarged, showing the larger stigma a few seconds after it has been disturbed.

is ready to receive pollen is hidden or covered. Hardly any method can be more admirable for securing a cross-fertilization of flowers.

Some time in April I received from the pine barrens of New Jersey a large plant in flower of *Pyxidanthera barbulata*. This was placed near the window on a dinner plate containing some water. The plant continued to produce an abundance of fresh

Fig. 2.

Fig. 3.



Flower of *Pyxidanthera barbulata*, enlarged.
Two of the sepals are removed.

The two-beaked anthers shown between the petals.



Oblique view of stamen, showing beaks and transverse opening in anthers.



Side view of stamen.

flowers for ten days or more. The small white flowers when

open look much like a small phlox, to which the plant is nearly allied. There are five stamens alternating with the lobes of the corolla, to which they are attached. The anthers are about as high as the stigma, towards which each one projects two short beaks. On pressing these beaks down with a pin, a mass of pollen oozes out of each transverse slit of the anther. After removing the pin, the beaks will again and again resume their places and the opening will close. After they were well open, I marked several fresh flowers and watched them two or three times a day for four or five days. In no case did any pollen escape from the anthers. These finally withered and shrunk up considerably, and the whole corolla, stamens and all, seemed to be lifted above the rest of the flower by the elongation of the calyx or some other cause.

This case seems to be dependent on insects for aid in fertilization. It is possible that fresh plants in their native place would not behave as did these sent by mail, but I think they would. If so, this queer plant is another of the hosts of plants which have a special contrivance by which insects are needed to aid in transferring pollen.—*Prof. W. F. Beal.*

WOLF AND HALL'S LIST OF THE MOSES, LIVERWORTS AND LICHENS OF ILLINOIS.—This list appears in Bulletin, No. 2, of the Illinois State Laboratory of Natural History. It is simply a dry list, without any remarks such as would seem to be in place regarding variation, &c.; but will prove undoubtedly of use to local botanists.

ZOOLOGY.¹

INTELLIGENCE IN CHIMPANZEE.—Some observations recently made on the mental faculties of the pair of young chimpanzees (*Troglodytes niger*) in the Zoological Garden, indicate the possession by those animals of the power of ratiocination to a very considerable degree.

A looking-glass having been placed in the cage they proceeded to investigate the novel phenomenon presented to them, but without much success until one of them, being engaged at the moment in munching a crust of bread, appeared to be struck by a similarity in the occupation of himself and of the figure before him. Withdrawing the bread from his mouth, he looked first at it and then at its reflected image, and then proceeded to place it in various positions, watching carefully the figure in the mirror, until he seemingly became satisfied that what he saw was, in some manner to him incomprehensible, himself, after which he passed some time sitting in front of the glass watching his own motions with much satisfaction.

A snake being placed in the room the animals manifested great

¹The departments of Ornithology and Mammalogy are conducted by Dr. ELLIOTT COUES, U. S. A.

terror, climbing at once to the top of the cage and uttering incessantly their peculiar cry of alarm. So great an impression was made on them that after the snake was taken away they remained aloft for fully two hours, and not even the sight of the dish and spoon with which they were familiar was enough to bring them down, although they gave evidence by their outstretched hands and their expressive faces that it would afford them great pleasure to have it handed up to their place of refuge; still they would not come down, and did not until their regular attendant, to whom they are much attached, came on the scene, when they promptly descended and embraced him fondly. He was then directed to place them near the glass front of the cage, and the snake was shown to them from the outside, but that which was so frightful at a distance of ten feet in the same room, lost much of its terrors when only six inches away but on the other side of an inch of plate glass; they merely uttered their *hoo-hoo* of displeasure and pointed at it with the forefinger.

To make certain that they had not merely become accustomed to its presence, it was again thrown through the door, when the two animals, panic stricken as before, fled wildly up the ropes.

In this connection an interesting fact was observed. Mr. Wallace, in "The Malay Archipelago," describing the habits of the orang, in Borneo, says, that when disturbed by the presence of a strange object, as a man, both the male and female ascend the trees, but that it is the female only who sounds the note of alarm and casts down fruit and branches to the ground. This would appear to be likewise the case with the chimpanzee, for when frightened by the snake the male laid down on the cross-beam where they took refuge, and only turned himself over occasionally to fix an eye on the enemy and to utter his expressive *hoo-hoo*, while the female placed herself directly over the snake, repeating constantly an entirely different sound, something like *whiy-whiy*, in a high shrill key, meanwhile leaning down towards the snake and violently striking against the beam with the palm of her hand. These actions are undoubtedly a part of the maternal instinct called forth in all animals with whom the female is charged with the duty of taking care of the young and protecting them from dangerous intruders.

In contemplation of the mental processes performed by the chimpanzees in clearly discovering their own identity with the figure reflected by the mirror, and in relying on the protection afforded by the glass front of their cage against their dreaded enemy, it is hard to see on what but the flimsy basis supplied by prejudice, can be founded such statements as that, for instance, made by Mr. Mivart, to the effect that the difference between the minds of man and the higher apes, "is a difference of kind and not one of degree." (Man and Apes, p. 149.)

The writer, for one, fails to see wherein these processes differ,

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except somewhat in degree, from the lowest efforts of the brain of a savage; indeed it is doubtful if the undirected faculties, those given by nature alone, of a human child of the same age—about four years—would produce results of a much higher grade. When to these, however, is added, by the art of man, the faculty of language, the human infant develops with amazing rapidity into the man of intellect, leaving far behind its late rival which grows only into greater bulk and force of muscle, the growth of the individuals thus epitomizing into a few years the whole history of the vast progress and the brutish immobility of the two races which they represent.—*Arthur Erwin Brown, June 20, 1878.*

IS THE ROCKY MOUNTAIN SHEEP COVERED WITH WOOL?—Two questions are very frequently asked of western hunters: "Is the 'bighorn' covered with wool?" and "Do antelopes shed their horns?" If a vote were taken on these two subjects both questions would probably be answered in the negative.

During a number of years I have had occasion to travel over the low country of the West, as well as through some of its most elevated portions. Within the latter I have often met with the Rocky Mountain sheep, or bighorn (*Ovis montana*). As the high mountains where these beautiful animals usually occur are not accessible during the cold seasons of the year, I never saw the sheep otherwise than covered with hair, somewhat resembling that of the antelope. It is neither so fine nor so straight as that of the deer, but very nearly of the same color. In the summer of 1877 my work carried me to the Wind River mountains, Wyoming Territory. On July 17th I found myself quietly resting on a rock, amid large fields of snow, at an elevation of about 12,000 feet above sea level. While studying the surrounding scenery I was aroused by the sounds of rapidly approaching steps. Looking up I saw four mountain sheep running towards me. At first I scarcely recognized the species of the animals. They were of a totally different color from any I had seen before, and seemed to have a very rough skin. By the time I had completed my observations the sheep (female) had done likewise, and were moving off in an opposite direction with considerable speed. A shot sent after their retreating forms wounded one of them, but all escaped.

July 25th a party of four of us ascended a high peak near the southern termination of the range, in north latitude $42^{\circ} 40'$ (approximately). As we reached timber-line, about 11,200 feet above sea level, we saw a band of more than one hundred mountain sheep. Several were secured by the aid of our rifles. Upon dressing them we found that the "hair" was shorter than usual—about three-quarters of an inch in length. It was apparently growing rapidly, and was pushing before it a layer of very fine *wool*, about half an inch in thickness. In other words, the sheep were shedding their wool. This latter is exceedingly fine, and of

a light gray color. Some portions of the body were already clear of it, but it still remained on the larger part thereof. This explained in a few moments the peculiar color and appearance of the sheep I had seen a week before. A foetal animal belonging to this species, which I had occasion to examine in 1875, showed a similar character of its covering. The skin was no longer fresh when I obtained it, and the proof was not so positive as in this instance.

The second question is not so readily answered. During the summer of 1877 I saw several thousands of antelopes, and passed through regions over which they had roamed for years. There I found quite a number of hollow antelope horns, lying on the ground. Each time I made careful search, in order to discover other bones of the animal, but in eight instances could discover none. It may be that coyotes dragged the horns to the places where they were found, but in this case other portions, either of skin or skeleton, would probably have occurred near the spot. A young male antelope fell a victim to one of my bullets, and upon examination I found that one of his horns had been injured. A slight exertion, only, sufficed to remove the horn from its "core." If antelope do shed their horns, a supposition to which I incline, they probably do it at irregular intervals, and perhaps only as the result of disease or injury. Not being a professional zoologist, I am unable to point out the affinities of these animals, which would render the shedding of horns either more probable or less, in accordance with their present taxonomic position.—*F. M. Endlich.*

(Note by the Editor). After several years familiarity with the prong-horned antelope in a wild state, I may say that I have never met with an undoubted case of shedding of the horn sheath. Shed horn-sheaths are not common where these animals abound, as they should be, were the phenomenon usual. Their appearance on the animal at times indicates that they may be shed, and I suppose that the evidence is sufficient that the shedding occurs. But it is not periodical nor even frequent.—*E. D. Cope.*

DISCOVERY OF TWO REMARKABLE GENERA OF MINUTE MYRIAPODS IN FAIRMOUNT PARK, PHILADELPHIA.—It has been my good fortune to detect *Polyxenes* and *Pauropus* in our splendid Park, thus adding two hitherto unnoticed articulates to the fauna of Pennsylvania. The former I regard as the *P. fasciculatus* of Say, and is about one-tenth of an inch long. Its detailed history is reserved for a future article. The *Pauropus* appears to be identical with *P. huxleyi* of Lubbock, at least after a most careful microscopical scrutiny of a number of specimens, I could find no character that would warrant specific distinction; the pyriform body between the two styles which surmounts the shorter of the two last segments of the antennæ being sessile as in the aforementioned species. The habitat was in the decayed roots of an old oak in

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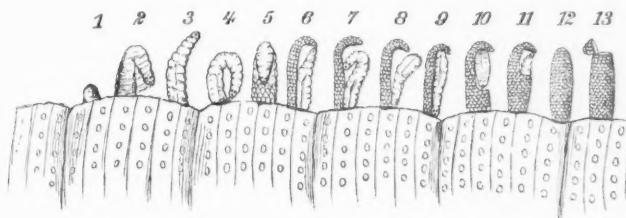
the passage ways and galleries of a nest of *Termites* or white ants, and I think it likely that this and similar situations will turn out to be their favorite haunts. The singular activity of the little creature as compared with that of the small *Collembola* and crustaceans which were its companions was very striking and rendered it very evident that we had encountered an organism which until then had escaped our observation. The little fellows when roughly handled rolled themselves up and "played possum," as do some Diplopods. They also seemed to be very sensitive to contact with a pointed style with which I frequently touched them, and which I think they perceived by means of the long lateral bristles of which there are four on each side as well as by means of the antennae. Much more active and quick in movement than *Polyxenes*, resembling in this respect the Chilopods, I am inclined to think that they are undoubtedly *Myriapoda*. Also the fact that I found many specimens with but three and four leg bearing segments is also evidence that they moult several times, as do their immediate allies, in passing from the immature to the adult state. As Lubbock has found the spermatozoa, and also noticed most of the other facts here mentioned, I would merely state that I have been so explicit only because desirous of confirming what seems to me to be that naturalist's just conclusions in regard to its myriapodal affinity. The species which I have found is white and is about 1-25th of an inch in length, which renders it a good subject to try the eyesight of a collector. With a magnifying power of a thousand diameters the styles or bristles which terminate the antennæ are seen to be made up of a great number of superposed disks or rings, and I have been unable to decide whether they are mere annular processes encircling the central axis of the style, or whether they are separate segments, though the flexibility of the styles would indicate that they were segmented. The clavate hairs are in like manner annulated.—*Jno. A. Ryder.*

[The discovery of *Pauropus (P. Lubbockii)* Packard at Salem, Mass., was announced in the NATURALIST in 1870 (vol. iv, p. 621). *Polyxenus fasciculatus* Say is not uncommon about Salem, Mass., under the bark of trees.—*Eds.*]

MODE OF CONSTRUCTION OF THE COCOONS OF MICROGASTER.—The construction of the cocoon of *Microgaster*, one of the Chalcidians, may be best observed under a moderate magnifying power.

The caterpillars most likely to be infested with these parasites are the large green and reddish ones of *Philampelus*, found on the grapevine and *Ampelopsis quinquefolia*. If half a dozen of these larvæ, when nearly full grown, are placed under a bell glass and fed every morning with fresh leaves of the vine from which they were taken, one or more will most likely be found to be infested with the larvæ of Chalcidians.

The first appearance of the parasite is represented in Fig. 1. A warty excrescence appears on the back of the caterpillar, which slowly emerges until it is seen to be a larva enclosed in a delicate transparent membrane, as represented in Fig. 2. This it soon succeeds in bursting, and rising to its full length, balances itself a moment as in Fig. 3, then bending double it ejects from its mouth a glairy liquid, which instantly changes to silk and fastens



FIGS. 1-13.—*Ichneumon (Microgaster)* spinning its Cocoon.

the posterior end to the skin of the caterpillar, as shown in Fig. 4, side view. It now begins to spin its cocoon by attaching a silken thread to the silky mass by which it had previously fastened itself to the caterpillar, and forming a series of loops of uniform size, first from right to left and then back again from left to right, as represented in the front view, Fig. 5, and better in the enlarged view Fig. 5 a, the arrow-heads showing the direction in which the head of the larva moved while forming the loops. The ends of the series, numbered 1, 2, 3, 4, are fastened to the edges of the ventral side of the body, which thus serves as a measure of the width of the cocoon and also acts as a support for the frail fabric in the first stages of spinning. After the larva has fastened the fabric as far up on its ventral surface as it can, conveniently, it then begins to spin free, as shown in the side view, Fig. 6, where it is represented as just completing the first half of its cocoon which resembles in form a slipper. This accomplished, the larva ceases to spin for the time being, bends its head, as in Fig. 7, towards its ventral surface and pushes the half cocoon free from its body. The form of the silken fabric enables it to stand unsupported, while the larva, sliding its head down to the base, holds on firmly until it swings its posterior end into the toe of the slipper.

Fig. 8 shows it in the act of changing end for end, and in Fig. 9 the larva is seen erect, beginning at the base to complete the

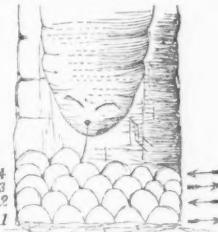


FIG. 5 a.

other half of its cocoon. Fig. 10 shows the larva contracting its body as it spins upward for about half the length of the cocoon, when it again changes end for end, as shown in Fig. 11, where it is beginning at the upper part to unite the two sides, finally enclosing itself as represented in Fig. 12.

It may now be seen, under the microscope, through the meshes of its cocoon actively engaged in lining the interior with layers of very fine silk ejected from its mouth in great abundance. One half of the cocoon is first lined by a forward and back movement of its head, and then reversing its position it lines the other half in a similar manner.

In one case the larva was disengaged from the skin of the caterpillar, after beginning its cocoon. It, however, began again, and spun a portion while lying on the table. This was removed, when it began a third time and completed its cocoon.

In about ten days the insect made its appearance through a hole in the upper end, as represented in Fig. 13. The top was eaten off in a perfect circle and hung by a few threads, so as to resemble a lid as it was thrown back.

One caterpillar observed had between three and four hundred cocoons on its back and sides, and another was dissected after more than thirty larvæ had escaped, and a hundred and thirty were discovered in the soft integuments of the back.

The figures from 1 to 13 are magnified five diameters, but in order to observe the spinning of the cocoon a power of fifty is required.—*John P. Marshall.*

ARGONAUTA TUBERCULOSA.—It should have been reported long ago that I had discovered a very fine and perfect shell of medium size, of the above, which was picked up August, 1876, from the surf washing at Point Comfort, New Jersey. This, in addition to the one obtained alive at Long Branch the same month and year, which I described in the *AMERICAN NATURALIST* for April, 1877, p. 243, increases the probability that the geographical range of the species is enlarging. I am satisfied now that both are the same species. Considering the frailty of the shell, and its exquisite perfection, no doubt can be held that its tenant was alive not many hours before the finding. The sheet containing drawing and measurements is mislaid, and the vain hope to find it has caused the delay in this communication.—*S. Lockwood.*

ANTHROPOLOGY.¹

ON THE PUNISHMENT OF PROSTITUTION AMONG THE ABORIGINES.—During the time of my trip through Arizona several years since, as a member of the U. S. Topographical Expedition for the Exploration of that region, I had an opportunity of seeing several

¹ Edited by Prof. OTIS T. MASON, Columbian College, Washington, D. C.

Coyotero Apache women who bore the brand of punishment, inflicted for prostitution. As the custom was then but seldom practiced, and has probably fallen entirely into disuse by this time, it may not be amiss to describe it. In his "Notes on the 'Tonto' Apachés," (Smithsonian Report, 1867, 417-419), Dr. Smart says, "he saw women who had the cartilaginous portion of the nose cut off, and this was apparent only amongst those who had any pretensions to beauty."

This statement was read at the time of its publication without giving it further thought, than that it might be merely a custom peculiar to the tribe, for some reason similar, for instance, to head-flattening, tattooing, or perhaps to puncturing the lips, or ears. But, when upon inquiry I was informed that all those who were so disfigured had been guilty of adultery, it appeared strange that so severe a punishment should have been in practice, and confined to so small an area, as none of the tribes immediately surrounding the territory of this sub-tribe of Apachés are known ever to have imitated them in this respect. But we find it to have been in practice among several other tribes outside of Arizona. In his allusion to this custom as practiced by the Comanches, Gregg says (Commerce of the Prairies, 1844, II, 308, 309), "The husband seems to have complete power over the destinies of his wife and children. For adultery, his punishment is most usually to cut off the nose or ears, or both, and he may even take the life of his unfaithful wife with impunity. The squaw who has been mutilated for such a cause is, *ipso facto*, divorced, and it is said forever precluded from marrying again." In reference to this tribe, Bancroft quotes (Vol. I, p. 515, *Author's Copy*) from the "*Revista Científica*" (I, 57), "Las faltas conjugales no se castigan por la primara vez; pero á la segundo el marido corta la punta de la nariz a su infiel esposa, y la despida de su lado."

Gregg (*Ibid.* p. 308) also states that "this custom prevails among the Creeks to the present day, and was anciently practiced by other southern nations. 'Among the Miami's,' says Father Charlevoix, 'the husband has a right to cut off his wife's nose if she runs away from him.'

Captain Roman's says that this custom prevailed among the Indians inhabiting Florida. (Concise History of East and West Florida, 1775, p. 98). Bancroft (II, 466) says that in Itztepec (Mexico) "the guilty woman's husband cut off her ears and nose, thus branding her as infamous for life." (Las Casas. Hist. Apolögética, MS., cap. cxiii; Mendieta *ubi sup.*).

"Among the Miztecs," says Bancroft (II, 466), "when extenuating circumstances could be proved, the punishment of death was commuted to mutilation of ears, nose, and lips." (Herrera, Hist. Gen., dec. III, lib. III, cap. xii.)

This singular punishment extended far down into Central America, but among many of the races inhabiting that country, death was the penalty.

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In Nicaragua the guilty wife was repudiated, while the guilty man was severely beaten with rods by the woman's relations. In regard to punishing the guilty man, the Egyptians had a similar custom. Diodorus Siculus says (Lib. I), "In case of adultery, the man was to have a thousand lashes with rods, and the woman her nose cut off." This seems a strange similarity, and I doubt not that many others could be found who practiced this custom among their respective tribes.—*W. J. Hoffman, M.D.*

THE DIMINUTIVE MOUNDS of Oregon Indians alluded to in the May number, page 322, can be seen and investigated at the present day near the former homes and haunts of the several Kalapuya tribes, although the majority of the natives were removed over twenty years ago (shortly after the Government treaty of 1855) to the Grand Ronde Reserve in Yamhill and Polk Counties. The Tuálati name for these earthworks is "*atidship*." Many of them are visible about six miles west of Forest Grove, on the eastern slope of a wooded hill, which slants down towards McCloud's Farm and the track of the narrow-gauge railroad. Low elliptic or oblong ditches include four five, six, or even seven of these rounded, parallel moundlets. This location was the ancient home of the Tuálati, or, as they call themselves, Atfálati tribe, who derived a portion of their daily food from the "wild potatoes" (or *wápatu* in Chinook jargon) growing at the bottom of the neighboring Wápatu Lake. It is the root or bulb of the *Sagittaria sagittifolia* and was gathered by the women of the tribe, who caught it between the toes, or by pressing both feet together, and had to stand in water up to the waist all day during the ripening season.

Although the custom of throwing up *atidship* is gradually disappearing among the Indians on Grand Ronde Reserve, some mounds of this description are still to be seen on a high hill north of the agency buildings. On this mountain top they awaited the rise of the sun after having exerted themselves during the night in carrying up-hill heavy rocks in Sisyphus fashion, and rolling them down again. Other hillocks are thrown up in the hush of night by the female portion of this Indian community, who seem more interested than the males in keeping up this antique custom of their forefathers, on a flat-topped eminence about one mile east from the seat of the Grand Ronde Agency.—*A. S. Gatschet.*

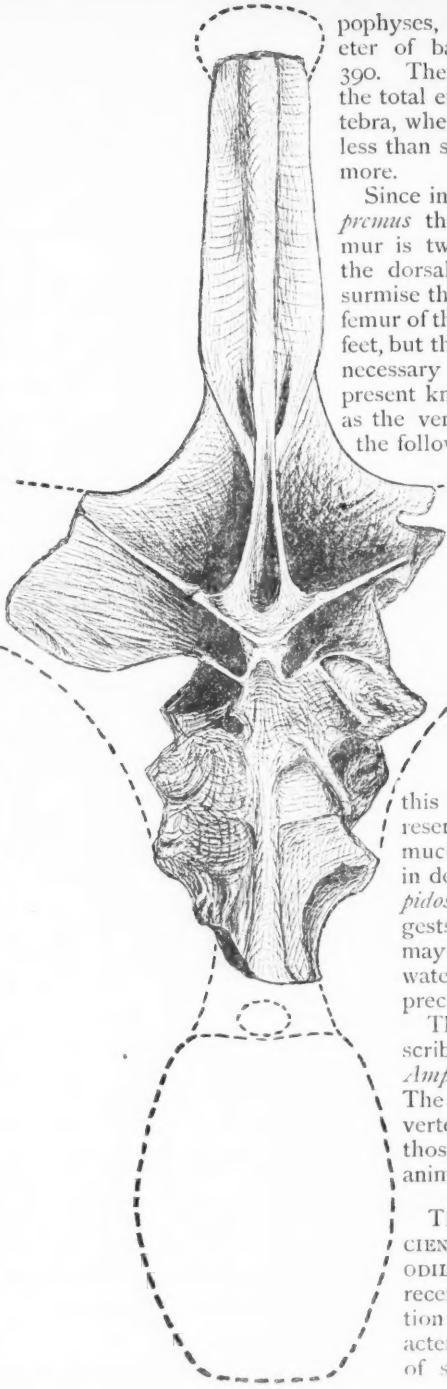
ATTENTION is called to the following titles of papers and separate publications: *Les sépultures de l'âge du renne de Solutré, Louvain, 1878, 54 pp., Extrait de la Revue des questions scientifiques, by Adrien Arcelin; "Ethnographic Parallels and Comparisons," Dr. Andree, Stuttgart* (the object of this publication is to bring together from all parts of the world evidences of the existence and use of the same implement or custom, as, for instance, meas-

ures of value, mothers-in-law, the umbrella as a mark of dignity, &c.); Die Ethnographie Russlands, Ergänzungsheft 54 to Petermann's *Mittheilungen*; Die Erhaltung der Turkei und die Völker-cultur, *Das Ausland*, 14; Through the Dark Continent, Henry M. Stanley, Sampson, Low & Co.; Anciens ateliers de taille de silex dans le chott de Ouargla (Sahara Occidental), pp. 104-189 dans le Bulletin de la Société Polymathique de Morbihan, C. de Cadoudal; Studii anthropologici ed etnografici i sulla Nuova Guinea, Firenze, 1877, 82 pp.; Die Gastfreundschaft auf niederen Culturstufen, *Das Ausland*, 15; Considerations sur les différents âges de la pierre: Reponse aux objections faites au congrès de Budapest, Dr. H. Jacquinot (Nevers), 1877, 16 pp.; Ueber prähistorische Bauart und Ornamentirung der Menschlichen Wohnungen, Dr. M. Much, *Gaea*, 4th Heft; On the Origin and Growth of Religion, Max Müller, *Contemporary Review*, May; L'ethnologie et le dixième chapitre de la Genèse, dans la Revue des Questions Historiques, t. xxiii, 1878, 64 pp., Louis Rioult de Neuville; Ein culturgeschichtlicher Roman, *Das Ausland* 15.

GEOLOGY AND PALÆONTOLOGY.

A NEW SPECIES OF AMPHICÖLIAS.—I have recently received from my indefatigable friend, Mr. O. W. Lucas, the almost entire neural arch of the vertebra of the largest saurian I have yet seen. It was found in the Dakota formation of Colorado, near Canyon city, in the same bed that has thus far produced the known species of *Camarasaurus*, *Amphicölias*, *Hypsirophus*, etc. In the extreme tenuity of all its parts, this vertebra exceeds those of this type already described, so that much care was requisite to secure its preservation. It exhibits the general characteristics of the genus *Amphicölias*, in the hyposphen, antero-posteriorly placed neural spine, and elevated diapophysis for the rib articulation. The diapophyses are compressed and supported by a superior and inferior, and anterior and posterior, thin buttresses, separated by deep cavities. As compared with the *Amphicölias altus*, this reptile differs in the greater elevation and attenuation of the neural spine, as well as its different form; also in the generally more laminar character of its buttresses and walls. The double rib of the anterior border of the spine of the *A. altus* is here represented by two laminae which extend on each side, so as to give a horizontal section of the spine a T shape. The posterior zygapophyses have less lateral expanse than in *A. altus*, but they continue as horizontal laminae with a deep cavity above and below: their superior surfaces contract into two ridges, which are separated by a deep groove. These ridges, unlike the anterior ones, approximate to each other closely on the border of the spine. The summit of the spine is wanting. The measurements are: total elevation of neural arch preserved, 1500 m.; elevation of posterior zygapophyses, 585; transverse expanse of posterior zyga-

Posterior dorsal vertebra of *Amphicalias fragillimus*, $\frac{1}{10}$ th natural size.



pophyses, 190; vertical diameter of base of diapophysis, 390. These figures show that the total elevation of this vertebra, when complete, was not less than six feet, and probably more.

Since in *A. altus* and *C. supremus* the length of the femur is twice the elevation of the dorsal vertebra, we may surmise that the length of the femur of this animal was twelve feet, but this is of course not a necessary consequence of our present knowledge. But so far as the vertebrae are concerned the following rule is without exception among the Saurians of the Dakota epoch: It is, that the size of the vertebra is in direct proportion to the attenuation of its walls. This latter character, as seen in this and other species, resembles nothing so much as what is seen in deep sea fishes, as *Alpidosaurus*, etc., and suggests that these beasts may have walked in deep water and browsed on precipitous shores.

The species above described may be called *Amphicalias fragillimus*. The dimensions of its vertebrae much exceed those of any known land animal.—E. D. Cope.

THE RELATIONS OF ANCIENT AND MODERN CROCODILES.—Prof. Owen has recently directed attention to the adaptive character of the modifications of structure which have

taken place in the course of development of the crocodilian order. These changes consist in the advance forwards of the external nares, the more posterior location of the internal nares, the increasing irregularity of the alveolar borders and sizes of the teeth, and the change from amphiccelous to procoelous vertebral articulations.

Prof. Owen proposes that these changes were concomitants of a gradual restriction of aquatic and increase of terrestrial habits, and the gradual diminution of a purely fish diet, and the adoption of land animals as food. The capture of the latter and their retention below the surface of the water until devoured, directly relate to the uses of, and hence necessity for, the new structures in question.

A NEW *DIADECTES*.—This very singular genus¹ of supposed Saurians, is represented by a third species from the Permian of Texas. The teeth are more completely molar in their character than in the species already described, being in the unworn condition as broad across the crown, as the latter is high. In the transverse direction the crowns are two and half times as long as wide. The extremities are rounded, and there is a median cusp extending across the crown; on each side of the cusp, the face of the crown is slightly concave. The enamel is strongly but finely wrinkled. The tooth series terminates abruptly in a tooth of half the transverse extent of the penultimate. Length of space occupied by penultimate and ante-penultimate teeth M. .021; length of base of penultimate .010; width of do. .024; elevation of crown, least .006; do. at cusp, .009.

This species is larger than those heretofore described, and the teeth are adapted for crushing harder bodies—having perhaps a use like those of *Placodus* or *Pycnodus*. It is called *D. molaris*.

GEOLOGY OF THE BRITISH ARCTIC EXPEDITION.—Geological investigation in the Polar regions is beset with difficulties of so grave a character that very few collections have hitherto been brought home by Arctic explorers, and these have necessarily been meagre. During Sir George Nares' expedition, however, special attention was paid to geological observations wherever practicable, and Captain Fielden thus contrived to collect more than two thousand specimens of rocks and fossils. He also had the good fortune to find his collections brought home in safety—a fact worth mentioning, because some other fine collections have been lost to science through the mishaps incident to Arctic traveling. The recently formed collections, and the results deduced from their study, were lately laid before the Geological Society. In working out the stratigraphical results, Captain Fielden has had the benefit of Mr. de Rance's aid, and in the palaeontological department that of Mr. Etheridge. The fundamental rocks

¹ American Naturalist, 1868, May, p. 327.

of the area under examination consist of gneiss which is probably of Laurentian age, the Canadian rocks extending into Polar area. These are followed by unfossiliferous slates and grits, known as the Cape Rawson beds, which are evidently older than the fossil-bearing Upper Silurians. It is proved, indeed, by the recent expedition, that Lower Silurian rocks exists in Grinnell and Hall Lands, thus disproving Murchison's view that the Polar area was dry land during the Lower Silurian period. Sixty species of fossils have been determined by Mr. Etheridge, ranging from the Lower to the Upper Silurian, and including some characteristic forms of Llandecilo and Wenlock age. The cream-colored dolomites found in abundance by some of the previous explorers are believed to represent the whole of the Silurian, and perhaps part of the Devonian period. True marine Devonians have been discovered for the first time in Grinnell Land. Here, too, the carboniferous limestone was found rising to a height of 2000 feet. This formation extends to the most northern point yet reached, and probably strikes beneath the Polar Sea to Spitzbergen. About thirty species, chiefly Brachiopods and Polyzoa, were procured from the carboniferous limestones of Cape Joseph Henry, the most northerly of the twenty localities from which fossils were collected.

Mr. Etheridge points out the greater resemblance of the Arctic palaeozoic fauna to that of America than to that of Europe. No mesozoic rocks are known until we reach the cretaceous strata, which are represented in Greenland by plant-bearing beds that indicate by their fossils a warm climate something like that of Egypt at the present day. The vegetation of the miocene beds in the Arctic regions points to climatal conditions about thirty degrees warmer than those which at present prevail. The miocene beds of Grinnell Land contain the common fir (*Pinus abies*) the birch, poplar, and other trees similar to those which occur in Spitzbergen. A seam of miocene coal, thirty feet in thickness, was discovered by the expedition at Lady Franklin Sound.—*Academy.*

GEOGRAPHY AND TRAVELS.¹

COLONEL PREJEVALSKY'S THIRD JOURNEY.—This distinguished Russian explorer has sent, under date of August, 1877, to the Russian Geographical Society, a report of a third journey in Central Asia. Translations of this report have been made by Dr. Petermann, published as a supplement to his *Mittheilungen*, with the original route maps and an Uebersichts-Karte of his journeys from 1872 to 1877; and also by Dr. R. Kiepert for the *Globus*. At the meeting of the Berlin Geographical Society, on the 6th of April last, Herr Von Richthofen read a very interesting paper upon the results of this journey. Colonel Prejevalsky was most fortunate

¹ Edited by ELLIS H. VARNALL, Philadelphia.

in making this exploration at a period when this region was held by Yakub-beg, at that time the ruler of Kashigar, who was assassinated about the middle of last year, and his kingdom overthrown by the Chinese. Neither a year earlier, nor at the present time, would such an expedition have been practicable. Leaving Kuldja, August 12th, 1876, he traveled in a general south-east direction, crossing the eastern Tian-Shan by a pass 9800 feet in height, called the Narat, and found that the rain-fall was plentiful on the north side where are abundant forests and game, but wholly deficient on the south side. He then entered upon an extensive plateau called Yuldus, about 8000 feet above the sea. Both in birds and mammalia the Yuldus is very rich. By a pass 9300 ft. in height he descended from this plateau, and before entering Korla (2600 feet, population 6000), on November 4th, 1876, he left behind the last spurs of the Tian-shan. Proceeding to the Valley of the Tarrim he passed a stony strip of country, probably the shore of a former sea, while beyond is a desert consisting of clay and sand. The clay is impregnated with salt, and on both sides of the Tarrim salt marshes are found. On December 18th he arrived at Charchalyk, between the Lob-Nor lake and the lofty mountains of Altyn-tag. He explored the northern slope of this range, which rises precipitously, as an immense wall, to the height of 12,000 to 14,000 feet. South of the Altyn-tag, it was learned, is a plateau of 13,000 feet in height, and beyond, other ranges of mountains, forming an enormous mountain chain covered with perpetual snow. The Tarrim and Lob-Nor desert is the poorest and most desolate region Prejevalsky had ever set eyes on. He then explored the northern face of the Altyn-Tag range which forms the northern escarpment of the Tibetan plateau. The mountains are about 14,000 feet high. These mountains, says the account in the *Geographical Magazine*, are characterized by great sterility, and it is only in the valleys and ravines that vegetation grows; yet, nevertheless, large swarms of locusts are here to be seen. In the summer of 1876 they committed great ravages, and rose to a height of 9000 feet in the mountains. The climate of the Altyn-Tag is characterized on its northern side at least by great cold and little snow. In summer, according to the natives, it rains frequently and is very windy. In this mountain region and the adjacent Kum-Tag desert there are a few wild camels, which twenty years ago were said to have been very common. They seek the upper valleys of the Altyn-Tag in the summer and the most inaccessible deserts in the winter. Their sight, sense of hearing and of smell are exceedingly quick, a striking contrast to the domesticated camel, which is just the opposite. Lob-Nor lake is supplied by the Tarrim river; it is shallow, overgrown with reeds and is for the most part a morass, the water being fresh, though there are salt marshes all around it. The inhabitants about the lake speak a language most like that of Khotan. The

exploration was made just before the invasion of the Chinese, the inhabitants being of Aryan stock and of the religion of Islam.

The Lob-Nor lake is elliptical in shape, is 90 or 100 versts in length and 20 versts in breadth. It is 2200 feet above the sea level. It is much overgrown with weeds, and, though surrounded by salt marshes, the water is clear and sweet.

The flights of birds of passage which make a resting-place of Lob-Nor in their migrations, were very carefully observed by Prejevalsky, millions during February passing on their way across the desert. None came from the south across the lofty and cold plateau of Tibet, but cross it where it is narrowest, *i.e.*, in the direction of Khotan. The region explored by Prejevalsky lies to the north of Tibet. The article is illustrated by a map.

On all sides, this great depression, forming a basin surrounded by the loftiest mountains of the globe, has been approached by the English and Russians, but never visited by any scientific or intelligent travelers. On our maps this basin of the Lob-Nor has been placed far beyond the great central mountain range of the Kuen-Lun, and nearer the Tian-shan system; whereas, according to Prejevalsky, it lies at the foot of the Altyn-tag, which he believes is, without doubt, the northern rampart of that mighty region of mountain and plateau, whose southern boundary rises over the plains of India, and thus extends in breadth over nearly thirteen degrees latitude—a distance equal to that from Naples to Hamburg.

In concluding his examination of the results of this very successful exploration, Herr Von Richthofen remarks that new discoveries bring new problems, as, for instance, the existence of a body of fresh water in a spot where all former accounts tell of a great salt sea, and where every theoretical conclusion would confirm us in the belief that such was the case. Count Béla Szécsenyi has already departed from Shanghai with the expectation of reaching the southern side of the Tarrim basin.

Meanwhile Col. Prejevalsky left Kuldja on August 28th, 1877, for Guchen, intending to penetrate into Tibet by Hami, Tsaidam and the upper course of the Yang-tse. Unfortunately, after reaching Guchen, sickness obliged him to return to Zaissan, and he is now on his way home to St. Petersburg.

A more recent journey by Captain Gill, in Western China, supplies, states the *Geographical Magazine*, an interesting confirmation of the apparent existence of a belt of exceedingly moist region between the Tibetan plateau and the lands encompassing it on its north-eastern and eastern sides. Prejevalsky, in his "Mongolia and Tangut Country," notices this feature while ascending the mountains south-west of Tajing; the Père Armand David noticed it during his residence at Mupin, north of Ching-tu-fu; Mr. Cooper, while making his way from the last-named

place into eastern Tibet; and Captain Gill's testimony now supplies us with a link between the observations of Prejevalsky and David, as he speaks of the wonderfully moist and semi-tropical character of the vegetation on the eastern side of the plateau, between the valleys Sung-pan-ting and Ling-ngan, on the extreme northern border of the province of Se-chuen.

DUTCH ARCTIC EXPEDITION.—The Willem Barentz, a two-masted schooner of eighty tons, built expressly for this service, with a crew of fourteen men, three officers, a zoölogist, a doctor, a photographer and eight sailors, sailed from Ijmuiden on the 5th of May, upon what may be regarded as an experimental voyage to Jan Mayen Island, thence to Spitzbergen, examining the edge of the ice en route, and calling at Amsterdam Island. Afterwards they hope to visit Novaya Zemlya and the Barentz Sea, returning home in October. Deep sea soundings will be made, and observations taken of the fauna, and flora; strength, and direction of currents; in magnetism, and meteorology. The expedition is supported by the contributions of Dutchmen.

GEOGRAPHICAL NEWS.—The last (June) number of Petermann's *Mittheilungen* contains a very interesting account of the application of the process of helio-gravure, by the Austrian Military Geographical Institute, to the production of the new maps of the Austro-Hungarian Empire. The maps are prepared on a scale of 1-60,000, and reduced photographically to a scale of 1-75,000. The (sun) engraving upon copper by the new process requires only about four weeks, whilst the engraving by hand would need forty-two months. The first sheets of this new map were issued in 1873; and, at the end of 1877, 271 were published, and it is expected that the whole number (715) will be completed within 10 or 12 years from the commencement of publication; whereas by the usual method a period of fifty to sixty years must have elapsed before the accomplishment of the work. The cost of the new process is only one-fourth that of the old. As regards the artistic appearance of these maps a specimen given in the *Mittheilungen* is most favorable; the impression being clear and sharp, and likely to deceive even an engraver.

The first volume of Dr. F. Ratzil, on the Geography of the United States, relating to physical geography, has lately been published. A second volume, on Social Geography, will next appear.

The *Geographical Magazine*, for June, gives the results of Nares' Narrative of a Voyage to the Polar Sea during 1875-76. Also a very complete map of the African Lake Region, with a notice of the advance sheets of Stanley's book. The map marks an era in African cartography. The review closes with this paragraph "Great as the value of Mr. Stanley's geographical research-

es are, and absorbing as is the interest excited by his narrative, we are inclined to attribute equal importance to the ethnological portions of his first volume. He has been most assiduous in collecting and arranging information respecting the habits and modes of life of the people, their arts and manufacture, and his account of the kingdom and people of Uganda, especially, is most valuable."

Mr. Alfred R. Wallace writes to *Nature*, June 20, 1878, to correct an error "in almost every detailed map of Australia, including some of the latest," consisting of a note placed at the head of the Alligator river in about S. Lat., $13\frac{1}{2}^{\circ}$, and E. Long., 133° —"steep walls, 3800 feet." He shows the absurdity of the existence of such precipices in a country where there are no important mountains, and only moderately elevated plateaus, and the fact that the supposed authority for the remarks, *Leichardt's Journal*, contains no such statement.

The failure of Congress to make an appropriation for Captain Howgate's Expedition to the Arctic regions, will compel Captain Tyson and his advance party, sent out last year, to return, as they were instructed to do, if the main expedition did not arrive at Disco by the latter part of August.

From dispatches to the *New York Tribune* and the *Philadelphia Press*, we learn, that this season Major Powell's labors will be mostly within the limits of Northern Arizona and Southern Utah. He expects to survey the region south of the grand cañon of the Colorado river, including the plateau country where the Moqui towns are situated. Of the seven rectangular sections (containing about 12,000 square miles each), included in his field of labor, maps of four have been completed, and it is hoped to complete the remaining three this year.

Dr. F. V. Hayden's corps will be engaged in Idaho and Montana. The area to be surveyed includes the Yellowstone National Park and the country lying to the south and south-east about the head of the Green, Snake, and Mud rivers. This will be an extension of the work of last year. Within this area is what is regarded as the true apex of the continent, its three greatest rivers, the Missouri, the Columbia and the Colorado rising in a peak in the northern end of the Mud River range. Lieutenant Wheeler's corps will be divided into three sections known as the Colorado, Utah and California sections.

The Colorado section will carry on its work chiefly in New Mexico, along the valley of the Rio Grande to the Mexican border, and between that and the Pecos. The Utah section, owing to the Indian troubles, will be transferred to California, and will operate along the Sierras, to join the triangulation from the base of Virginia City, to that from the base of Los Angelos to the north and east. The California section will move north from Fort Bidwell, and will examine an area of 16,000 square miles into

the Columbia River basin. Another portion will move south from Carson, Nevada, and occupy triangulation points on the Sierras, and survey a portion of the range south of Mono Lake. A party is assigned to the Washoe mining region.

The Atlas of Colorado has now been completed by the U. S. Geological Survey, and gives the results of the labors of Dr. F. V. Hayden, and his corps, in geography and geology.

Colorado is now better known topographically than any other State.

In an article in the *Geographical Magazine*, on the productive zones of Russia in Europe, five of these regions are enumerated. There are, starting from the north, the *tundras*, then the forest and agricultural region (forming three zones), and the steppes. The *tundras*, those bare, damp Arctic wastes, are as a rule to be found between the Arctic Circle and the Polar ocean. They are frozen in winter and generally thaw to the depth of a foot or so in summer. Turf moss (*Sphagnum*) and reindeer moss (*Cladonia rangiferina*) are both to be found, and the latter is a product of economic importance, though in eight or ten days a herd of reindeer will generally exhaust a pasture of it. These animals yield so little milk that it takes at least a hundred of them to support one family. The entire area of the *tundras* in Europe amounts to about 144,820 square miles (English).

The two-masted schooner *Eothen*, of 102 tons, a sixteen-year old whaling vessel, recently refitted, sailed from New York on the 19th of June for Repulse Bay. She has on board the members of the Franklin Search Party, consisting of the commander, Lieut. Frederick Schwatka, U. S. A., Col. W. H. Gilder, Joseph Eberling—"Esquimaux Joe," of the Polaris Expedition,—Henry W. Klutchack and F. F. Melvers. At Repulse Bay they are to be reinforced by seven Esquimaux, and, as soon as there is sufficient snow, they go by sledging to a point near Cape Englefield, where they expect to find a cairn containing relics of the Franklin expedition. They are to return during the winter of 1879-1880 to Repulse Bay. They take with them a valuable equipment of scientific instruments and are directed to take daily observations. Dr. John Rae, in a letter to Chief-Justice Daly, President of the American Geographical Society, published in the *New York Herald*, again expresses his disbelief in the existence of this cairn for the following reasons: (1.) That it is most improbable that any of the crew of Franklin's ships should have reached the locality mentioned, situated a distance of 300 miles over the very rough and partially open ice of Boothia Gulf and where no aid could be obtained. (2.) That in 1854, when he visited the regions between Repulse Bay and Boothia Gulf, he examined the Esquimaux of this region, but heard nothing of the existence of this cairn, although they knew of the cairn erected by him near Cape Englefield in 1847 and of the cache left by

Ross at Victoria Harbor in 1832. (3.) Capt. Hall, in 1868, was within thirty miles of the reported position of the cairn, but heard nothing of it.

MICROSCOPY.¹

MICROSCOPICAL SECTION, TROY SCIENTIFIC ASSOCIATION.—A regular meeting of this Society was held on Monday evening, May 6th, the Chairman, Dr. R. H. Ward, in the chair.

Dr. Ward gave a discussion of some recent experiments in microscopic ruling, an account of which will be published shortly. Rev. A. B. Hervey, Vice-Chairman of the Section, gave a very clear summary of the classification of algae by means of fructification, and illustrated the six principal groups into which the Red sea-weeds are divided by the following preparations: No. 1, *Ceramium rubrum* Ag., showing in its various stages of development, the fruit produced by the simple subdivision of the cell-contents of a fructified mother-cell; No. 2, *Callophyllis variegata* Ag., having the nucleus of the cystocarp compound, and the masses of spores separated by intervening sterile cells; No. 3, *Plocamium procrrum* Ag., from the highest order in the third series, the spores being produced by the gradual development of bead-like strings of small cells, or "spore threads," arising from a common base or centre and often branched, and when fully developed, filling the cystocarp with a mass of sub-angular spores, all the cells of a given spore-thread appearing to develop simultaneously, but some of the threads in these sections, not having been fecundated and developed, appearing in their original state and form; No. 4, *Curdica laciniata* Harvey, showing characteristic fruit of the series where a mass of fine, closely packed, moniliform "spore threads," arising from a basal placenta, form the spores by the successive ripening and falling off of the end cells of the fecundated threads; No. 5, *Gelidium cartilagineum* Grev., illustrating the series having an immersed cystocarp, a placenta central as in this species or more frequently basal or parietal, and club-shaped spores developed at the end of very short spore threads; and No. 6, *Polysiphonia fibrillosa* Grev., having the cystocarp external and somewhat highly developed, and the spores large and club-shaped. The specimens were mounted in sea-water and glycerine, by the instantaneous method described in the May number of the NATURALIST, and showed the typical fructification of the different series with great distinctness. After study and discussion by the section, the series of slides was tendered as a special box to the "Postal Club."

A regular meeting was held Monday evening, June 3d, Dr. Ward in the chair. The chairman presented a box of slides prepared for the section by Mr. C. C. Merriman, of Rochester, a corresponding member. The slides were mainly the result of Mr.

¹This department is edited by DR. R. H. WARD, Troy, N. Y.

Merriman's scientific work during a recent visit to the Bermudas, and were prepared with some originality of method, and with exquisite workmanship. After study of the objects, a vote of thanks was passed to Mr. Merriman for his donation.

Mr. C. E. Hanaman made some remarks in regard to the methods he had found most convenient for cleaning and handling slides and cover-glasses.

For cleaning slides as received from the hands of the dealers, a solution which has long been used by photographers for cleaning their negative plates and glass vessels, is as efficacious as the nitric acid bath, and wholly free from its disagreeable odors. The mixture consists of a cold saturated solution of bichromate of potash in water, to which about one-eighth its bulk of strong sulphuric acid is added, the mixture being made in a porcelain or thin glass vessel, as the heat evolved would be likely to break a bottle, and the vessel being kept outside a window until the mixture is cool, after which no more injurious vapor will be given off, and the liquor will be ready for use. A gross or two of slides may be cleaned in an incredibly short time by sliding them one by one into a porcelain vessel containing some of this liquid, tilting the vessel about a few moments to cause the liquid to flow through the mass, and then pouring off the liquid and placing the vessel under the stream from an open tap for a few minutes. They are then wiped dry with soft linen cloths, and spread upon a clean sheet of paper, each slide being gently breathed upon on both sides, and the most perfect surface, which exhibits the most perfect film of moisture, being placed downwards. They are then centered on a self-centering turn table, upon the upper or poorest side, by a dot and a ring of india ink; they may then be placed on their edges in a box or drawer, and kept from contact by little strips of blotting paper placed between their ends.

The cover glasses, after being treated with the cleaning liquid and thoroughly washed with distilled or filtered water, are picked out with the forceps, one by one, and dried by laying each on one corner of a soft linen cloth on the table, and gently rubbing first one side and then the other with another part of the cloth. The cloths (worn out handkerchiefs, &c.), used for this purpose should be first cleaned by boiling with carbonate of soda and rinsing in hot filtered or distilled water. If the covers are finally arranged, edge upwards, in a box or drawer between strips of thick white blotting paper, they will be kept clean and the selection of any desired thickness will be greatly facilitated. The strips of blotting paper should be cut two thirds as wide as the cover, should reach from side to side of the drawer, and should be separated at the ends by squares of the same paper, thus forming a rack in which the covers can stand, edge upwards, and from which they can be readily picked out.

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He recommends that one or two grooved blocks be kept on the working table, in which covers that have been selected for immediate use may be similarly supported on edge, and from which they can be easily taken by the forceps. Such a block is prepared by setting a circular saw so as to cut only $\frac{3}{8}$ th of an inch deep, and then passing over it several times a block of white wood, in such manner as to cut a series of parallel grooves on the side which is to be used as the top of the block. Standing covers in these grooves is a great improvement on the common method of leaning them against the base of the microscope or some other convenient but unsuitable object.

NEW MICROSCOPICAL JOURNALS.—The *Journal de Micrographic*, published monthly in Paris, under the very able editorial management of Dr. J. Pelletan, has already achieved, within a few months from the time of its first issue, a character of its own, not only as a successful business enterprise, but also as a powerful, independent and original scientific organ. It treats with equal ability and prominence both the theory and use of the microscope, and, in addition to original papers on the subject, gives a thorough and judicious summary of papers and progress in other countries. It is really occupying a field in which it has no competitor in any part of the world, and our only selfish regret about it is that there is not an edition in the English language which would render it useful to a larger number of readers in this country. It is published by G. Masson, 120 Boulevard St. Germain, Paris, France, at \$6 a year.

Prof. Romyn Hitchcock proposes to begin the publication, about the first of November, of a new journal to be called *The American Quarterly Microscopical Journal*. It will be published at three dollars a year, and will give, in addition to illustrated original articles, a summary of the progress of the science, gathered from all available sources. The support of many prominent microscopists has been promised, and the good-will of all will be extended to the attempt to establish a journal of a class which has hardly attempted before to live in this country. The address of the *Journal* is P. O. box 2335, New York City.

NEW AMERICAN OBJECTIVES.—Mr. Frank Wilkins, who formerly worked for the Ross House, of London, but now is with Mr. John Roach, of San Francisco, is making objectives which the members of the San Francisco Society consider equal to a good grade of English lenses. Our Pacific friends are much pleased at this notable addition to their local resources.

MINERALS FOR THE MICROSCOPE.—Mr. Chas. H. Denison, 531 California street, San Francisco, is supplying by mail specimens suitable for the microscope, selected from the characteristic minerals of the Pacific coast. Of course the various forms and combinations of gold, silver and cinnabar are made prominent among the selections offered.

SCIENTIFIC NEWS.

— Under the title of *Die Vereinigten Staaten von Nord Amerika, Erster Band. Physikalische Geographie und Natur character*, Dr. F. Ratzel, of München, has written a voluminous octavo of 667 pages, illustrated with five colored maps. After discussing the geology and physical geography, the author describes in a general way our river-systems and lakes, with the climate, and under the caption of the vegetable world, the relations of the vegetation and climate to those of Europe and Asia, the distribution of our forests, prairies and plains or steppes; in two appendices the author enters into the vexed question of the origin of prairies, and other botanical subjects. The last chapter is devoted to the animals of the United States, giving a general view of the distribution of animal life, and a view of our characteristic mammals, birds, reptiles, amphibia and fishes, molluscs, insects and lower animals; and the work closes with a series of sketches of our forest scenery, the Hudson river, the scenery of New England, the Alleghenies, the pine barrens, the Floridian tropical scenery, Niagara Falls, and a glance at the Rocky Mountains and California.

— The first Annual Report of the U. S. Entomological Commission has recently made its appearance, and forms a volume of about 750 pages. The main report contains chapters on a variety of subjects, and is copiously illustrated with lithographic plates, three maps and woodcuts. Naturalists will perhaps be interested in the chapters on the distribution, metamorphosis and anatomy of the locust. The report is mainly practical in its scope, so as to be of immediate use to western farmers. A further appropriation was made at the last session of Congress for the completion of the work.

— In view of publishing a work on the Antiquity of Smoking and the Aboriginal Art of Pipe Making, Mr. E. A. Barber, West Chester, Pa., requests the co-operation of archaeologists. Any notes, references, accurate sketches, with explanations, or other information bearing on the subject, will be thankfully received and fully credited. Drawings, cuts, or photographs of unique or odd pipes, snuff-boxes, etc., of aboriginal tribes, are more especially desired. The object of the work will be a more careful review of the history of smoking and its dissemination among different peoples, particularly among pre-historic nations.

— A finely illustrated work, entitled *Iconographia Crinoideorum in statis Sueciæ Siluricis fossilium. Auctore N. P. Angelin. Opus postumum edendum curavit Regia Academia Scientiarum Suecica, Cum tabulis xxix, Holmiæ, 1878*, will interest American students of Silurian Crinoids. There are thirty-four pages of text, and the twenty-nine folio plates are beautifully drawn.

There are a good many details given regarding the arrangement of the plates of the calyx, and a number of Cystideans are illustrated.

— Prof. Edward Forbes and his Country, is the title of an interesting sketch of this gifted naturalist, and of the Isle of Man, his birthplace, prepared by Robert Garner for the *Midland Naturalist*, the journal of the associated natural history, philosophical and archaeological societies and field clubs of the midland counties of England. We have seen several numbers of this journal sent to Hayden's U. S. Geological Survey, and American naturalists would find it to be a readable, attractive periodical.

— The Chicago Academy of Sciences presents a good record of progress during the past year. The total number of specimens in the Museum is 30,049, the shells amounting to 15,000, and the insects to 6,000 specimens. The list of papers read numbers 21 titles. Explorations in Florida have been made by Messrs. Velie and Calkins. One hundred and ten foreign societies and thirty American ones send their publications.

— The appointment of Prof. Spencer F. Baird to the Secretaryship of the Smithsonian Institution, is in every way appropriate. Prof. Baird's familiarity with the workings of the Institution, together with his wide acquaintance with the sciences, and with the needs of scientific men, are guarantees that a continuation of its prosperous career awaits the Smithsonian.

— Entomological Contributions, No. iv., by Mr. J. A. Lintner, extracted from the thirtieth annual report of the New York State Museum of Natural History, for the year 1876, contains a variety of articles relating chiefly to the Lepidoptera; a few of them are of a practical, economic nature.

— Recent arrivals at the Philadelphia Zoölogical Garden: 1 raccoon (*Procyon lotor*); 7 hog-nosed snakes (*Heterodon platythinus*); 2 chain snakes (*Ophibolus doliatulus triangulus*); 1 scarlet ringed snake (*Cemophora coccinea*); 1 milk snake (*Coluber obsoletus confinis*); 7 colubers (*Coluber vulpinus*); 2 black snakes (*Bascanion constrictor*); 3 water snakes (*Tropidonotus sipedon*); 1 copperbelly snake (*T. sipedon erythrogaster*); 4 garter snakes (*Eutenia sirtalis*); 2 garter snakes (*E. sirtalis parietalis*); 1 young snake (*Bascanion [?]*) from Indiana; 1 copperhead (*Ancistrodon contortrix*); 2 milk snakes (*C. obsoletus confinis*); 1 pine snake (*Pitvophis melanoleucus*); 14 prairie dogs, (*Cynomys ludovicianus*), born in the garden; 4 ruffed grouse (*Bonasa umbellus*), born in the garden; 1 spotted cavy (*Caelogenys paca*); 1 mule deer (*Cervus macrotis*), born in the garden; 2 gray gophers (*Spermophilus franklinii*); 2 common marmosets (*Hassale jacchus*); 1 stoat (*Putorius erminea*); 1 fallow deer (*Dama vulgaris*), white var., born in the garden; 1 lizard (*Sceloporus*); 1

song thrush (*Turdus musicus*), England; 1 robin (*Turdus migratorius*); 1 gray fox (*Vulpes virginianus*); 2 prairie wolves (*Canis latrans*); 2 swift foxes (*Vulpes velox*); 1 spider monkey (*Ateles belzebuth*), Brazil; 1 coati (*Nasua narica*), red var., Brazil; 1 opossum and 11 young (*Didelphys virginiana*).

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PROCEEDINGS OF SCIENTIFIC SOCIETIES.

APPALACHIAN MOUNTAIN CLUB.—June 12.—The reports of the Councillors of Topography and Art presented their report. Mr. W. H. Pickering described some new points of interest near Campton, N. H.; Miss M. F. Whitman read a paper entitled "Moat Mt. Experiences."

June 22.—The Club made an excursion to Mt. Wachusett.

July 10.—The fifth field meeting was held at the Fabyan House, White Mountains, N. H. Mr. Samuel H. Scudder spoke of the insects of high altitude in North America. Prof. C. H. Hitchcock exhibited a model of the White mountains, and read an explanatory paper, including the results of recent explorations.

ENTOMOLOGICAL CLUB OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—The annual meeting of the Club will be held at St. Louis, Mo., on Tuesday, August 20, 1878, at three o'clock, p. m. All entomologists who are interested are invited to assist, and will report at the headquarters of the Association at the Lindell Hotel, on the 19th or 20th, where they will be informed of the exact place of meeting. The meetings of the Association will begin on the morning of August 21. Prof. J. K. Rees, at St. Louis, will give information to members about car fares and accommodations. B. Pickman Mann, Secretary.

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SCIENTIFIC SERIALS.

THE PALEONTOLOGIST, Cincinnati, July 2, 1878; U. P. James.—We have received the first number of this publication, which appears in octavo size, and is very neatly printed. We are informed on the title page that it will be issued whenever there is sufficient material in a state of preparation to warrant it. Its object is stated to be to insure "early publication of scientific memoirs in geology and palaeontology, in order to avoid the frequent delays when depending on the regular serials, journals and proceedings of societies." This number containing a paper by Mr. U. P. James, on extinct *Invertebrata* from the Lower Silurian formation, and includes descriptions of twenty-nine species.

We have to remark on the advent of this publication, that we always regret the appearance of a new scientific journal unless

it be well supported by the "sinews of war," or have a field not already occupied by an existing one. Nevertheless, the method which marks the primitive stage of scientific organization of allowing incompetent persons to have charge of the issue of scientific serials, must result in independent publications. So whatever the *raison d'être* of the publication before us, it offers an example of the only way of escaping various abuses.

ZEITSCHRIFT FÜR WISSENSCHAFTLICHE ZOOLOGIE, Supplement May 28.—On the first embryological phases of *Tendra zostericola*, by W. Repiachoff. Contributions to a knowledge of Protozoa, by A. Schneider. On the form and signification of organic muscle-cells, by W. Flemming. Remarks on the anatomy of *Limnadia hermanni*, by F. Spangenberg. Studies on the history of the Polish *Tur* (*Ur, Urus, Bos primigenius*), by A. Wrzesiowski. On the unity of structure of the brain in the different orders of insects, by J. H. L. Flögel. *Archigetes sieboldi*, a sexually mature Cestode nurse, by R. Leuckart. The Epiphysis in the brain of Plagiostomes, by E. Ehlers.

ARCHIV FÜR NATURGESCHICHTE, Jahrgang 44, Heft. 3.—Herpetological studies, by J. von Bedriaga. Contribution to anatomy of the integument of mammals, by H. Ribbert. Attempt at a natural classification of the spiders, by G. Bertkau. Reflections on the theory by which season dimorphism in butterflies may be explained, by P. Kramer. Contribution to a knowledge of hermaphroditism and the spermatophores in the nephropneutic Gastropods, by G. Pfeffer.

ANNALES DES SCIENCES NATURELLES, March 20—Observations on the structure of the eyes of crustacea and worms, by J. Chatin. Observations on the *Notommata Werneckii*, and its parasitism in the tubes of *Vaucheriae*, by M. Balbiani.

JENAISCHE ZEITSCHRIFT FÜR NATURWISSENSCHAFT, March 15.—Individuality in animals, by E. Haeckel. The Leptomedusa of Heligoland, by R. Böhm.

PSYCHE, Jan., Feb.—Recent Progress of Entomology in North America, by S. H. Scudder. Bibliographical Record.

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ERRATA.—Page 351, line 18, for *equalis* Stm. read *ochracea* Brandt. Page 353, line 24, for Sb read Stm. Page 209, line 10, for rarely read surely. Page 211, line 15 from bottom, for true lily read tree-lily.

